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# RECOVERED CHEMICAL WARFARE MATERIEL (RCWM) RESPONSE

**ENGINEER PAMPHLET**



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## AVAILABILITY

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DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

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Explosives
RECOVERED CHEMICAL WARFARE MATERIEL RESPONSE

1. Purpose. This pamphlet provides the U.S. Army Corps of Engineers (USACE) personnel with detailed procedures on the process to be used to manage and execute all aspects of Recovered Chemical Warfare Materiel (RCWM) response actions. This document addresses all activities, from investigation through removal, that occur on a RCWM site.

2. Applicability. This pamphlet applies to all Headquarters, USACE (HQUSACE) elements and all USACE commands having responsibility for performing CWM response activities.

3. Distribution Statement. Approved for public release; distribution is unlimited.

4. References. Required and related references are at Appendix A.

5. Explanation of Abbreviations and Terms. Abbreviations/acronyms and special terms used in this pamphlet are explained in the glossary.

FOR THE COMMANDER:

5 Appendices
(See Table of Contents)

ROBERT CREAR
Colonel, Corps of Engineers
Chief of Staff

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# CHAPTER 1
# INTRODUCTION

1-1. Policy. The policy of the USACE is to plan and execute Recovered Chemical Warfare Materiel (RCWM) response actions in a manner that fully meets customers' expectations of quality timeliness, and cost effectiveness within the bounds of legal responsibility. An acceptable level of quality does not imply perfection; however, there should be no compromise of functional, health, or safety requirements. Adherence to the Quality Management principles outlined in Engineer Regulation (ER) 5-1-11, U.S. Army Corps of Engineers Business Process, and ER 1110-1-12, Quality Management, will contribute to achieving this goal. RCWM response procedures must be formulated to ensure harmony with the USACE Strategic Vision and should be executed in concert with activities presented in other USACE guidance.

1-2. RCWM Response Overview.

a. Description of the RCWM Response Process.

(1) RCWM response activities include actions taken to reduce the risk to human health and the environment from exposure to RCWM resulting from past Department of Defense (DOD) operations at a site. Guidance for sites that contain chemical agent contaminated media (CACM) will be published separately. The discussions in this pamphlet apply to all activities at RCWM sites.

(2) The definition of OE, per ER 1110-1-8153, Ordnance and Explosives Response, includes RCWM. Therefore, RCWM Response projects are conducted in accordance with the same procedures used for OE response actions. This Engineer Pamphlet (EP) discusses the procedures and requirements that are unique to RCWM projects. A reference will be provided to EP 1110-1-18, OE response for procedures and requirements that are applicable to RCWM and identical to the requirements for OE.

b. RCWM response at Formerly Used Defense Sites (FUDS), Active and Transferring Installations. A discussion of the requirements for conducting CWM Response at FUDS, Active and Transferring Installations is provided in EP 1110-1-18.

c. Execution of CWM Response Actions. In accordance with ER 1110-1-8153, the USAESCH is the only USACE command authorized to execute RCWM projects. If the presence of RCWM is suspected at a site the Project Manager (PM) must coordinate with the US Army Engineer and Support Center, Huntsville (USAESCH) prior to beginning any on-site activities.

1-3. RCWM Response Regulatory Authorities.

a. A discussion of the governing laws and regulations for any specific RCWM response project is provided in EP1110-1-18. This discussion provides an overview of the legal authorities for conducting a RCWM response project, including the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), National Oil and Hazardous Substance Pollution Contingency Plan (NCP), Defense Environmental Restoration Program (DERP) (including the FUDS program and Installation Restoration Program (IRP)), Base Realignment and Closure (BRAC) program, Resource Conservation and Recovery Act (RCRA), Environmental Protection Agency (EPA) Military Munitions Rule, and Applicable or Relevant and Appropriate Requirements (ARARs).

# CHAPTER 2
# RESPONSIBILITIES

## 2-1. Introduction.

a. This chapter describes the responsibilities and functional roles of the USACE organizations and potential stakeholders in the RCWM response process.

b. OE response actions at RCWM sites will be performed in accordance with ER 1110-1-8153. The USACE is responsible for the overall project management and on-site management for RCWM projects. Execution of all phases of a RCWM project within the USACE is the responsibility of the USAESCH OE Design Center. ER 1110-1-8153 provides responsibility matrices delineating organizational responsibilities throughout the process.

c. Throughout this document, district review and approval responsibilities for project activities are discussed. These responsibilities have been delegated by the Major Subordinate Command (MSC) to the assigned district within their geographic area.

d. Districts requiring additional information beyond that discussed in this document should contact the OE MCX.

## 2-2. Organizational Responsibilities.

a. MSC Commanders are assigned overall responsibility for the safe and efficient execution of all RCWM response actions for all projects for which they are the Project Manager (PM) in accordance with ER 5-1-11.

b. The responsibilities for Headquarters, United States Army Corps of Engineers (HQUSACE) for planning and executing a RCWM response action are discussed in ER 1110-1-8153 and EP 1110-1-18.

c. The responsibilities detailed herein are FUDS specific. For projects under the management of an active or transferring installation, the installation may want to retain some degree of management control. In such cases, the PM will hire the appropriate OE Design Center to provide USACE assistance in a manner that is transparent to the customer, but the PM will remain the interface with the installation.

d. It is the responsibility of all USACE personnel involved with the RCWM program to safely execute RCWM response actions in accordance with applicable laws, regulations, and policies. All USACE organizations will ensure that all personnel involved with on-site activities are familiar with and

have access to copies of the approved Safety Submission prepared for the site-specific activities to be conducted. In addition, each organization will ensure that such personnel have received appropriate training, medical surveillance, and personal protective equipment required by the safety plan, contract specifications, Occupational Safety and Health Administration (OSHA) Standards, USACE regulations, and applicable DOD and Department of the Army (DA) regulations.

e. All USACE elements will ensure that RCWM response actions include provisions for meaningful stakeholder involvement pursuant to all applicable laws, regulations, and policies.

2-3. Functional Roles. The following section provides a general description of key functional roles in the RCWM response process. The functional roles for non-USACE agencies has been extracted from their respective guidance documents.

a. USACE.

(1) HQ, Safety and Occupational Health Office (CESO). CESO has responsibilities that include safety and occupational health and other supporting issues related to the proper implementation and execution of the OE program activities under USACE management (such as DERP, BRAC, range clearance, etc.). Corps of Engineers Safety Office (CESO) is the HQUSACE Point of Contact (POC) for the OE safety and occupational health program and will:

(a) Oversee the safety and occupational health program and policy issues within the USACE OE Program.

(b) Coordinate the OE safety and occupational health program and health policy issues with higher headquarters and DOD elements.

(c) Approve OE Explosives Safety Submissions (ESS) and selected RCWM Safety Submissions and forward them to higher headquarters.

(d) Review, approve, and disseminate safety and occupational health technical guidance developed by the OE MCX or others.

(e) CESO will conduct the pre-operational survey, when delegated this responsibility by the Headquarters Department of the Army (HQDA) Safety Office.

(2) PM. The PM is located at the district executing the RCWM response project. The PM leads the RCWM project team, coordinates all project activities, serves as a liaison with other stakeholders, and reviews/approves project documents as required.

(3) District.

(a) As delegated by the MSC, the district will assign a PM to lead the RCWM project team, coordinate all project activities, serve as a liaison with other stakeholders, and review/approve project documents as required. The PM will manage RCWM response projects in accordance with ER 5-1-11.

(b) The MSC may assign support functions to the district during a RCWM response action. The district may perform these functions or further delegate them to USAESCH. Examples of these responsibilities include:

- Provide site construction support.
- Provide site security.
- Acquire rights-of-entry (ROE).
- Provide medical support and training.
- Establish and maintain the Administrative Record.
- Prepare the Public Evacuation or Shelter-in-Place Plan, as necessary.
- Prepare the Memorandum of Agreement with local support agencies.

(4) USAESCH OE Design Center.

(a) USAESCH OE Design Center POC. The USAESCH OE Design Center POC is the central figure responsible for coordination of the USAESCH OE Design Center functions for the RCWM response action, and acts as the liaison between the USAESCH OE Design Center and the PM. Further information on the responsibilities of the USAESCH OE Design Center POC is presented in ER 1110-1-8153.

(b) Engineering. The USAESCH OE Design Center provides multi-discipline engineering support to the RCWM project team. Engineering support during RCWM response projects may include, but is not limited to, the following:

- Engineering design of structures, facilities, and excavations.
- Blast effects analysis.

- Surveying.
- Geographic information systems.
- Geophysical investigations.
- Soil sampling and analysis.
- Systems safety.
- Risk assessment.
- Permitting.
- Planning.
- Preparation of technical Statements of Work (SOWs).
- Cost estimating and contract negotiation support.
- Review of work plans and Safety Submissions.
- Coordination of technical issues.
- Other efforts requiring engineering and technical expertise contained within the USAESCH OE Design Center.

(c) The USAESCH OE Design Center will perform all contracting actions for RCWM sites. Responsibilities include:

- Assure all RCWM-related Request for Proposals (RFP), Commerce Business Daily Announcements (CBD), new contracts, SOWs, and delivery orders have been reviewed by an OE Safety Specialist prior to issuing/awarding.
- Assure an interdisciplinary structured proposal evaluation team, which includes an OE Safety Specialist for all RCWM-related contracts.
- Assure current Data Item Descriptions (DIDs) are used in all RCWM-related contracts. Current DIDs are available on the OE MCX website at http://www.usace.army.mil/oew.

- Plan, direct, coordinate, and accomplish actions required to select, negotiate, award, administer, modify, and terminate contracts for RCWM projects.

- Appoint a Contracting Officer's Representative (COR) when applicable. The Contracting Officer (CO) is the only person with the authority to enter into, administer, or terminate contracts. The CO and the officially designated COR may bind the government only to the extent of the authority delegated to them. Regardless of the exigencies of the site, the CO/COR are the only individuals who can "direct" a contractor to perform work, and then only within the limits of delegated authority.

(5) USAESCH OE Safety Manager. The USAESCH OE Safety Manager is located within the USAESCH OE Directorate. Responsibilities of the OE Safety Manager include:

(a) Review Site Safety and Health Plans (SSHP).

(b) Ensure RCWM response activities occur in accordance with OSHA guidance; Engineer Manual (EM) 385-1-1, U.S. Army Corps of Engineers Safety and Health Requirements Manual; and ER 385-1-95, Safety and Health Requirements for Ordnance and Explosives Actions.

(c) Ensure compliance with applicable safety regulations.

(d) Review and approve abbreviated SSHPs (ASSHP).

(e) Review Work Plans for RCWM response projects prior to field activities.

(6) OE Safety Specialist. The OE Safety Specialist for RCWM response actions is located within the USAESCH OE Directorate. Responsibilities of the OE Safety Specialist include:

(a) Provide on-site safety and health support for RCWM activities.

(b) Review the Archives Search Report (ASR), delivery orders, SOW, Work Plan, and Safety Submission.

(c) Verify UXO qualifications of contractor employees.

(d) Verify training and physical exam records.

(e) Advise the contractor on RCWM procedures.

(f) Coordinate exclusion zone activities with on-site agencies.

(g) Facilitate military Explosive Ordnance Disposal (EOD) response, when needed.

(h) Provide technical safety support to USACE districts and contractors.

(i) Conduct government quality assurance (QA) inspections of completed work.

(j) Assist the district/installation in preparation of Chemical Event Report on-site, when necessary.

(7) OE MCX. In addition to the responsibilities presented in ER 1110-1-8153, the OE MCX will:

(a) Review federal, DOD, and DA regulations related to OE and RCWM and propose implementation guidance to HQUSACE to ensure USACE compliance.

(b) Review and approve RCWM and RCWM-related products in accordance with ER 1110-1-8153.

(c) Provide technical support throughout USACE.

(d) Review and evaluate RCWM detection and removal technology.

(e) Develop RCWM-specific contract requirements and maintain current contract DIDs.

(f) Assist HQUSACE in identifying RCWM program training requirements.

(8) Construction. The district Construction Division may oversee field activities outside of the exclusion zone; administers construction contracts; provides administration support; and may be assigned as the COR on a case-by-case basis.

(9) Office of Counsel (OC). The district OC renders legal assistance to the RCWM project team. The OC provides legal interpretation and advice on applicability of environmental statutes and regulatory requirements, contract acquisition and claim issues, including review for legal sufficiency of all associated settlement agreements and environmental restoration decision documents. Due to the nature of RCWM response projects, the OC should be consulted on all matters involving questions of regulatory or statutory authority or requirements. The OC supporting the OE MCX is available to the RCWM project team for consultation.

(10) Real Estate. The district Real Estate Division performs real estate functions to support a RCWM response action, such as obtaining rights-of-entry, reviewing deed restrictions, and preparing real property transfer documents.

(11) Public Affairs. The district Public Affairs Office (PAO) provides for planning, developing, and managing public involvement and media relations for RCWM response projects. PAO personnel will coordinate with the OE Safety Specialist prior to discussing any specific RCWM-related matters. The district PAO should contact the USAESCH OE Design Center POC and PAO to coordinate the RCWM technical content prior to release.

(12) Hazardous, Toxic and Radioactive Waste (HTRW) CX. When there are mixed contaminants (HTRW, RCWM) on the project site, refer to ER 385-1-92.

b. Assistant Secretary of the Army (Installation and Environment) (ASA (I&E)). The ASA (I&E) is responsible for establishing overall Army environmental, safety and occupational health statutory compliance. These responsibilities are carried out through the Deputy Assistant Secretary of the Army (Environment, Safety and Occupational Health).

c. Director of Army Safety, Office of the Chief of Staff, U.S. Army. The Director of Army Safety, Office of the Chief of Staff administers and directs the Army Safety program as specified in Army Regulation (AR) 385-10, Army Safety Program. Responsibilities include:

(1) Establish safety policy and standards for the Army chemical safety program for investigation of chemical defense research, development, testing and evaluation events.

(2) Coordinate and approve safety waivers and exemptions to personnel safety policies.

(3) Approve Safety Submissions for RCWM activities.

(4) Conduct pre-operational surveys for RCWM activities.

d. US Army Technical Center for Explosives Safety (USATCES). Responsible for reviewing for DA Safety RCWM Safety Submissions and forwarding to Department of Defense Explosives Safety Board (DDESB) for approval or concurrence as appropriate. USATCES is also the agent for DA Safety for executing the DA Pre-Operational Survey Exercise required by DA Pam 385-61, Toxic Chemical Agent Safety Program, for RCWM project sites.

e. Department of Defense Explosives Safety Board (DDESB). Responsible for approving or concurring with RCWM Safety Submissions, as appropriate.

f. Army Operations Center (AOC). Responsibilities of the AOC include:

(1) Receive notification of RCWM discoveries and events.

(2) Notify Army staff elements of RCWM discoveries and events.

(3) Coordinate emergency response to RCWM discoveries and events.

g. Program Manager for Chemical Demilitarization (PMCD). The US Army PMCD is responsible for the transportation and final disposition of RCWM recovered during a RCWM response action.

h. Program Manager for Non-Stockpile Chemical Materiel (PMNSCM). Within the PMCD, the PMNSCM has the following responsibilities:

(1) Provide centralized management and direction to the DOD for treatment and disposal of non-stockpile chemical materiel in a safe, environmentally sound and cost-effective manner.

(2) Transport, treat and dispose of RCWM (including preparation of necessary documentation for transportation and storage site selection).

(3) Assure RCWM is transported off-site in accordance with the Transportation Plan, as published by PMNSCM.

(4) In coordination with USAESCH, prepare transportation, Interim Holding Facility (IHF), and disposal plans for the Safety Submission and provide coordination of all plans with the U.S. Department of Health and Human Services (DHHS). PMNSCM will contract with TEU to perform the majority of the activities required by these plans. USAESCH will be responsible for some of the requirements of these plans such as site security and site preparation for the IHF.

i. US Army Soldiers Biological and Chemical Command (SBCCOM).

(1) Surgeon. The SBCCOM Surgeon acts as a consultant to the USAESCH on RCWM projects. Regulations require medical support requirements be reviewed by the Major Command (MACOM) surgeon and because USACE has no medical assets, the SBCCOM Surgeon is consulted. Liaison with the surgeon is through the USAESCH Safety Office.

(2) Edgewood Chemical and Biological Center (ECBC). Responsibilities of the ECBC on a RCWM site include:

(a) Conduct air monitoring for chemical agent as tasked by USAESCH.

(b) Conduct agent and agent degradation product analyses as tasked by USAESCH.

(c) Sample unknowns that are suspect RCWM, as necessary (e.g., utilizing a glove box).

(d) May support USACE to maintain any filter units for vapor containment as tasked by USAESCH.

(e) Prepare the monitoring and analysis portion of the Safety Submission. The USAESCH contractor is required to summarize the ECBC plans in the Work Plan and/or SSHP.

(3) Technical Escort Unit (TEU). Responsibilities of the TEU on a RCWM site include:

(a) Conduct on-site assessment of RCWM recovered during the response action in accordance with AR 50-6, Chemical Surety.

(b) Perform on-site air monitoring utilizing the Miniature Chemical Agent Monitoring System (MINICAMS), if required during an emergency response or requested by the customer during response actions.

(c) Conduct other on-site activities as tasked by USAESCH (e.g., D2PC modeling, emergency response, anomaly excavation).

(d) Package and transport recovered RCWM as tasked by PMNSCM.

(e) Conduct emergency destruction of RCWM munitions on-site as necessary.

(f) Additional information is provided in 1 April 1997 Memorandum of Agreement between the 52nd Ordnance Group (EOD) and USAESCH.

j. Department of the Army Chemical Agent Safety Council (DACASC). Responsibilities include:

(1) Serve as an open forum to evaluate, discuss, and coordinate chemical agent safety and health issues at the HQDA level.

(2) Research and develop chemical agent safety policy recommendations for the Director of Army Safety (DASAF) and chemical agent safety issues as requested by Army leadership.

(3) Assess the safety and health of the chemical agent stockpile and disposal (stockpile and non-stockpile) programs.

(4) Evaluate and recommend Army approval of alternate chemical protective equipment and clothing, chemical agent monitoring equipment, and requirements and procedures for chemical agent decontamination and disposal.

k. Chemical Agent Safety and Health Policy Actions Committee (CASHPAC). Responsibilities include, but are not limited to:

(1) Serve as a technical working group responsible for resolving chemical agent safety and health issues for the executive director for Chemical Agent Safety and for the Army Materiel Command (AMC) Safety Office.

(2) Recommend approval to HQDA, Army Safety Office of the personal protective equipment (PPE) matrix including a description of level A and B suits and air purifying respirators used in a chemical agent environment.

l. Materiel Assessment Review Board (MARB). The MARB was established under the authority and direction of the Deputy Chief of Staff for Chemical and Biological Matters, AMC. The board is chaired by the Commander, TEU with membership selected from the explosives ordnance community, the chemical weapons research and development community, PMNSCM, and a historian from SBCCOM. USAESCH has two non-voting members on the MARB. Responsibilities of the MARB on a RCWM site include:

(1) Evaluate recovered munitions suspected of containing lethal chemical agent using all available documentation, pictures, x-rays, drawings, physical data, Portable Isotopic Neutron Spectroscopy (PINS) data and expertise of each member of the MARB.

(2) Provide recommendations on the disposition of such munitions through a record of determination and decision for each munition. This record of determination and decision is forwarded to the Commander of the concerned installation or district from the SBCCOM Commander. If a consensus regarding disposition of a munition is not achievable, the MARB will determine the need for further information and delay action until such information is available.

m. Office of the Surgeon General (OSG). The OSG, through the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), has the following responsibilities:

(1) Provide policy on the health aspects of pollution resulting from Army activities and operations.

(2) Provide guidance, including educational materials on environmental health aspects, recommendations to mitigate or control adverse impacts and to protect individuals from hazardous exposure, and health risk assessments for environmental restoration.

(3) Develop toxicological profiles concerning military-unique chemicals and unregulated hazardous substances (i.e., those not specified in 10 USC 2704a).

(4) Establish environmental standards for chemical agents and weapons demilitarization.

(5) Develop and prepare chemical exposure and drinking water criteria for environmental contaminants (in particular, military-unique compounds) for ASA(I&E) promulgation.

(6) Conduct toxicity studies and develop health advisories and standards, criteria, and protocols for chemical exposure and drinking water.

(7) Approve health risk assessments.

(8) Establish public health criteria and standards for Army use.

(9) Recommend standards for the safe storage, use, discharge and ultimate disposal of hazardous materials and, in the absence of environmental and public health effects criteria, develop, compile and evaluate environmental toxicology data.

(10) Monitor the public health and environmental aspects of the Army's waste management programs.

(11) Advise USACE on the health aspects of managing hazardous and solid waste.

n. US Department of Health and Human Services (DHHS). The DHHS is required by Public Law 91-441 to provide concurrence for plans related to the transport or disposal of lethal chemical warfare agent(s). Therefore, once the Safety Submission is approved by Department of the Army, Office of the Chief of Staff (DACS-SF) it will be forwarded to DHHS by PMNSCM.

2-4. Other Stakeholders' Roles. Stakeholders will actively participate in the RCWM response process. Stakeholders typically include: private landowners; federal land managers; Indian Tribal Governments; Restoration Advisory Boards; and federal, state, and local regulators. A description of the roles of these stakeholders is presented in EP 1110-1-18. Additional information on stakeholder involvement is provided in EP 1110-3-8, Public Participation in the Defense Environmental Restoration Program for FUDS.

# CHAPTER 3
# PROJECT EXECUTION

3-1. Introduction.

a. This chapter discusses project requirements for USACE elements involved in RCWM response projects. Several RCWM project requirements are identical to the requirements for OE projects. These requirements include: business management practices; project prioritization; the project team approach; project management plans; scheduling; project funding; project reporting requirements; contracting; estimating; and real estate activities.

b. Project Management for RCWM projects will be implemented in accordance with ER 5-1-11.

3-2. Property Management. As a general policy, contractors are normally required to furnish all equipment and materials necessary to perform their contract tasks. However, when deemed to be in the best interest of the government, equipment/materials (e.g., vehicles, engineering controls, explosives, magnetometers, etc.) may be provided to the contractor by the government.

a. There is some Government Furnished Property (GFP) available for use on RCWM project sites. This equipment has been used on past RCWM project sites and has been contaminated with RCWM agent. It has been properly decontaminated and the agent is no longer detectable at the action levels. This category of equipment will remain under Government control. This equipment can be used on future RCWM project sites by government contractors with the proper procedures in place. The intent of using these pieces of equipment in lieu of buying or leasing new equipment is financial efficiency. If any of this category of GFP is necessary on the RCWM project site, coordination will be accomplished between USAESCH, the contractor, and the supporting agency.

b. If GFP is not provided but the contract requires specialized equipment or materials that are not included in the contractor's overhead rate, procurement or lease may be authorized. In all cases, property management will comply with the Federal Acquisition Regulation (FAR), other applicable DOD and DA policies, and with the internal policies of the district or USAESCH OE Design Center, as appropriate.

c. Additional information on project management is provided in EP 1110-1-18. Topics discussed include: GFP provided to the contractor, acquisition planning, acquisitions, property management plan, and contract surveillance.

3-3. Quality Assurance. Quality assurance requirements for RCWM response projects include project QA and programmatic QA. These requirements are discussed in EP 1110-1-18. Quality planning, government QA and contractor quality control (QC) are also discussed in EP 1110-1-18.

3-4. Public Participation. Public participation is an integral component of the RCWM response process. The USACE is committed to providing public participation activities during RCWM response projects. The requirements for public participation during a RCWM response project are discussed in EP 1110-3-8.

3-5. Environmental Considerations.

a. The district, in consultation with their OC and the OC supporting the OE MCX, as required, is the lead USACE agency on environmental issues related to RCWM response actions and is responsible for coordinating with regulators on these issues. Environmental issues will be addressed in project work plans prior to fieldwork.

b. RCWM response actions must be conducted consistent with CERCLA and the NCP. There are some unique federal requirements that may apply to RCWM actions, as well as some state considerations. The district must ensure that it has evaluated the applicable requirements and addressed those that are specific to that particular site. The impact of these regulations will not be the same at each site due to differences in site geography and differences among state/local regulations, for example. Vigilance must be constantly exercised to ensure that applicable changes in Federal, state, or local regulations are addressed. Additional information on Federal statutes and regulations, state laws and regulations, and local regulations is presented in EP 1110-1-18.

(4) Other Environmental Laws for RCWM Response Actions. Table 3.1 presents a summary of DOD directives, instructions, and regulations relevant to the environmental aspects of RCWM response actions. This table may be used as a checklist in determining the applicable environmental laws for a specific project. EP 1110-1-18 presents additional tables of other environmental laws that may be applicable to RCWM response actions, and additional environmental laws and regulations that may be applicable at specific RCWM contaminated sites.

3-6. Geophysical Considerations. Detailed procedures for geophysical considerations for RCWM projects are provided in EM 1110-1-4009.

Table 3.1
Department of Defense Directives, Instructions and Regulations for RCWM Response Actions

| Directive/Regulation | Title | Contents/Regulations | Applicable (Y/N) |
|---|---|---|---|
| 29 CFR 1910 | Labor | Describes labor specific requirements for working on potentially contaminated sites that may involve employee exposure or the reasonable possibility for employee exposure to safety or health hazards. | |
| 29 CFR 1926 | Construction | Describes Safety and Health regulations for Construction activities | |
| AR 50-6 | Chemical Surety | Prescribes policies, procedures and responsibilities for the Army Chemical Surety Program. Chapter 10, Recovered Chemical Warfare Materiel and Chapter 4, Chemical Accident or Incident Response and Assistance/Event Reporting, apply to RCWM sites. The rest of the chapters discuss chemical surety requirements which do not apply to non-stockpile RCWM sites. | |
| AR 200-1 | Environmental Protection and Enhancement | Prescribes Army policies, responsibilities, and procedures to protect and preserve the quality of the environment. | |

Table 3.1 (continued)
Department of Defense Directives, Instructions and Regulations for RCWM Response Actions

| Directive/Regulation | Title | Contents/Regulations | Applicable (Y/N) |
|---|---|---|---|
| AR 200-2 | Environmental Effects of Army Actions | Contains Army procedures for implementing "National Environmental Policy Act" (NEPA). | |
| AR 385-10 | Army Safety Program | This regulation provides DA policy, responsibilities, and procedures to protect and preserve personnel and property against accidental loss. It provides for public safety incident to Army operations and activities. This regulation assures statutory and regulatory compliance. This regulation also provides the risk assessment model for use on OE project sites. | |
| AR 385-61 | The Army Chemical Agent Safety Program | Provides policy on the management of the chemical agent safety program. It provides procedures for requesting waivers and exemptions to these standards. | |
| AR 385-64 | US Army Explosives Safety Program | Provides protection guidance for sites involving OE. It sets explosives safety standards to protect the public, the workforce and the environment. It is to be used with DA Pam 385-64. | |

Table 3.1 (continued)
Department of Defense Directives, Instructions and Regulations for RCWM Response Actions

| Directive/Regulation | Title | Contents/Regulations | Applicable (Y/N) |
|---|---|---|---|
| CESO-E Memorandum | SUBJECT: Applicability of Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel Response Activity Interim Guidance | This Memorandum directs the implementation of the DACS-SF Memorandum at all USACE activities. | |
| DA Pam 40-173 | Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT | Explains medical occupational policies and provides procedures pertinent to mustard agents H, HD and HT. The medical policies and procedures are prescribed in AR 50-6. | |
| DA Pam 40-8 | Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX | Explains medical occupational policies and procedures pertinent to nerve agents GA, GB, GD and VX. The medical policies and procedures have been aligned with AR 50-6. | |

Table 3.1 (continued)
Department of Defense Directives, Instructions and Regulations for RCWM Response Actions

| Directive/Regulation | Title | Contents/Regulations | Applicable (Y/N) |
|---|---|---|---|
| DA Pam 50-6 | Chemical Accident or Incident Response and Assistance Operations | Explains the policies and procedures prescribed for CAIRA operations in AR 50-6. Chapter 6 discusses the medical support requirements on RCWM sites, Chapter 11 discusses environmental monitoring, and Chapter 17 discusses training requirements (e.g., table top exercises and pre-operational surveys). | |
| DA Pam 385-61 | Toxic Chemical Agent Safety Standards | Establishes the Army safety program for all aspects of military toxic chemical agents. Provides guidance on management of the toxic chemical agent safety program, as well as specific toxic chemical agent safety technical requirements. | |
| DA Pam 385-64 | Ammunition and Explosives Safety Standards | The purpose of pamphlet explains the Army's safety criteria and standards for operations involving ammunition and explosives prescribed by AR 385-64. | |

Table 3.1 (continued)
Department of Defense Directives, Instructions and Regulations for RCWM Response Actions

| Directive/Regulation | Title | Contents/Regulations | Applicable (Y/N) |
|---|---|---|---|
| DA, Office of the Assistant Secretary Installations Logistics and Environment Memorandum * | SUBJECT: Interim Guidance for Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel Response Activities, 5 Sep 1997 | The purpose of this Interim Guidance is to ensure the protection of workers, the public, and the environment during RCWM response activities and ensure that these response activities are conducted in accordance with safety and environmental laws and requirements. It defines RCWM, risk assessments, characterization, recovery and packaging, and Safety Submissions. | |
| DACS-SF Memorandum* | SUBJECT: Approval of Safety Submissions for Non-Stockpile Chemical Warfare Materiel Response Activities, 29 Feb 2000 | This document outlines procedures for the coordination, review and approval of RCWM Safety Submissions and changes to RCWM Safety Submissions. | |

* these memoranda can be located at http://www.dac.army.mil/ES/default.asp?id=17

Table 3.1 (continued)
Department of Defense Directives, Instructions and Regulations for RCWM Response Actions

| Directive/Regulation | Title | Contents/Regulations | Applicable (Y/N) |
|---|---|---|---|
| DACS-SF Memorandum* | SUBJECT: Applicability of Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel Response Activity Interim Guidance, 19 Mar 1998 | This Memorandum assists local commanders, installation commanders, and district commanders in determining if in the Interim Guidance is to be followed on project sites where construction, or environmental response actions other than a RCWM investigation or removal project is conducted at a site with a history of RCWM. | |
| DOD 6055.9-STD | Ammunition and Explosives Safety Standards | Primary DOD regulation that requires unexploded ordnance cleanup of DOD lands prior to transfer. | |
| DOD Directive 1000.3 | Safety and Occupational Health Policy for the Department of Defense | Establishes the basis for all DOD safety, fire protection, and occupational health programs | |
| DOD Directive 4165.60 | Solid Waste Management-Collection, Disposal, Resource Recovery and Recycling Program | Sets DOD policy and procedures for the DOD comprehensive program of solid waste collection, disposal, material recovery, and recycling in accordance with USEPA guidelines, NEPA, and RCRA. | |

* Memorandum can be located at http://www.dac.army.mil/ES/default.asp?id=17

Table 3.1 (continued)
Department of Defense Directives, Instructions and Regulations for RCWM Response Actions

| Directive/Regulation | Title | Contents/Regulations | Applicable (Y/N) |
|---|---|---|---|
| DOD Directive 4500.9 | Transportation and Traffic Management | Describes general DOD transportation and traffic management policies. | |
| DOD Directive 4700.4 | Natural Resource Management Program | Sets DOD policy for management and protection of natural resources. | |
| DOD Directive 4710.1 | Archeological and Historical Resources Management Program | Establishes DOD policies and procedures for protection and management of archeological and historical resources. | |
| DOD Directive 5100.50 | Protection and Enhancement of Environmental Quality | Assigns responsibilities and establishes policies and procedures for protection and enhancement of environmental quality in consonance with federal policy and other DOD issuances. | |
| DOD Directive 6050.1 | Environmental Effects in the United States of DOD Actions | Implements Council on Environmental Quality regulations and provides policy and procedures to enable DOD officials to take into account environmental considerations when considering the authorization or approval of major DOD actions in the United States. | |
| EM 385-1-1 | Safety and Health Requirements Manual | This manual prescribes the safety and health requirements for all Corps of Engineers activities and operations. | |

Table 3.1 (continued)
Department of Defense Directives, Instructions and Regulations for RCWM Response Actions

| Directive/Regulation | Title | Contents/Regulations | Applicable (Y/N) |
|---|---|---|---|
| EP 1110-1-18 | Ordnance and Explosives Response | Provides procedures for the management and execution of OE response actions. | |
| ER 1110-1-8153 | Ordnance and Explosives Response | Establishes roles and responsibilities for USACE elements in managing and executing OE response actions and authorizes and provides for the delegation of such roles and responsibilities. | |
| ER 385-1-92 | Safety and Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities | Identifies the safety and occupational health documents and procedures required to be developed and implemented by USACE elements and their contractors responsible for executing HTRW activities. | |
| ER 385-1-95 (DRAFT) | Safety and Health Requirements for Ordnance and Explosive Response Actions | Identifies safety and health requirements, responsibilities, and procedures for response actions. | |

3-7. Location Surveying and Mapping. An overview of location survey and mapping considerations for OE response projects is provided in EM 1110-1-4009. Detailed survey, mapping, and GIS requirements may be found on the OE MCX website at http://www.hnd.usace.army.mil/oew.

3-8. Geographic Information Systems (GIS). The GIS assembles all the data required to associate the non-intrusive subsurface geophysics investigative data to the correct geographical location, the relational database, mapping, and remote sensing data. It provides a standard methodology to assist in the assembly of all past, current, and proposed OE project information into a common reference for analysis, management and storage in a digital format for the project's administrative record.

3-9. Innovative Technologies in RCWM Response Actions.

a. Innovative technologies, like any other engineering tool, must be applied appropriately to a RCWM response project. The best available technology for each RCWM response project may vary due to differing, as well as highly unpredictable, site conditions.

b. The OE MCX has been charged with reviewing, evaluating, and approving the implementation of the best available OE detection and removal technologies for OE response projects. The OE MCX ensures that the implementation of innovative technologies is efficient and effective. The OE MCX defines current technology and functional requirements, provides consulting services to projects, identifies technology gaps, provides seed money to field improved technologies, and supports other technology programs. To assist with these functions, the OE MCX maintains an OE Innovative Technology Program.

c. Additional information on the Innovative Technology Program and the Innovative Technology Advocate is provided in EP 1110-1-18.

# CHAPTER 4

# RCWM RESPONSE OVERVIEW

4-1. Introduction. This chapter discusses the types of activities and tasks, which may be implemented during a RCWM response action and the corresponding safety and health plans and procedures, which are required.

4-2. Documents and Procedures Required on Suspect RCWM Sites.

a. Overview.

(1) This section presents information on the documentation and procedures required on a suspect RCWM site. Information regarding when a district may perform work on a RCWM site is also provided.

(2) All planned response activities in an area suspected of containing RCWM will be conducted in a manner protective of public and workers health and the environment. Prior to conducting any activities on a suspected RCWM site, approved safety and health plans and procedures are required in accordance with the 29 Feb 2000 HQDA Memorandum "Approval of Safety Submissions for Non-Stockpile Chemical Warfare Materiel Response Activities". The level of effort for these plans and procedures is dependent on site activities or tasks (i.e., the potential for encountering RCWM.) Figure 4-1 details the process for determining which safety and health plans and RCWM requirements are applicable to activities on a RCWM site.

(3) The process discussed below applies to all investigative, removal or construction activities performed at an OE or HTRW site by a district or MSC. If the site is suspected to be contaminated by RCWM, the plans and requirements discussed in sections 4-2b through f must be followed. Performing RCWM investigation and/or removal on suspect RCWM sites is the responsibility of the USAESCH OE Design Center. If the presence of RCWM is suspected at a site, the district must coordinate with USAESCH prior to beginning any on-site activities. In accordance with ER 1110-1-8153, the USAESCH is the only USACE command authorized to execute Non-Stockpile RCWM projects.

b. Site Visits. If site activities include only a site visit (walk through of the site) and no intrusive activities are planned, the only safety and health plan required is the Abbreviated Site Safety and Health Plan (ASSHP). This ASSHP must contain RCWM-specific information (i.e., what to do if a suspect RCWM item is found). Therefore, it is strongly recommended that the USAESCH ASSHP be used. The format of the ASSHP can be obtained from the OE MCX website at http://www.hnd.usace.army.mil/oew. Prior to the site visit, the ASSHP must be approved by the OE Safety Manager or designee, in accordance with EP 1110-1-18.

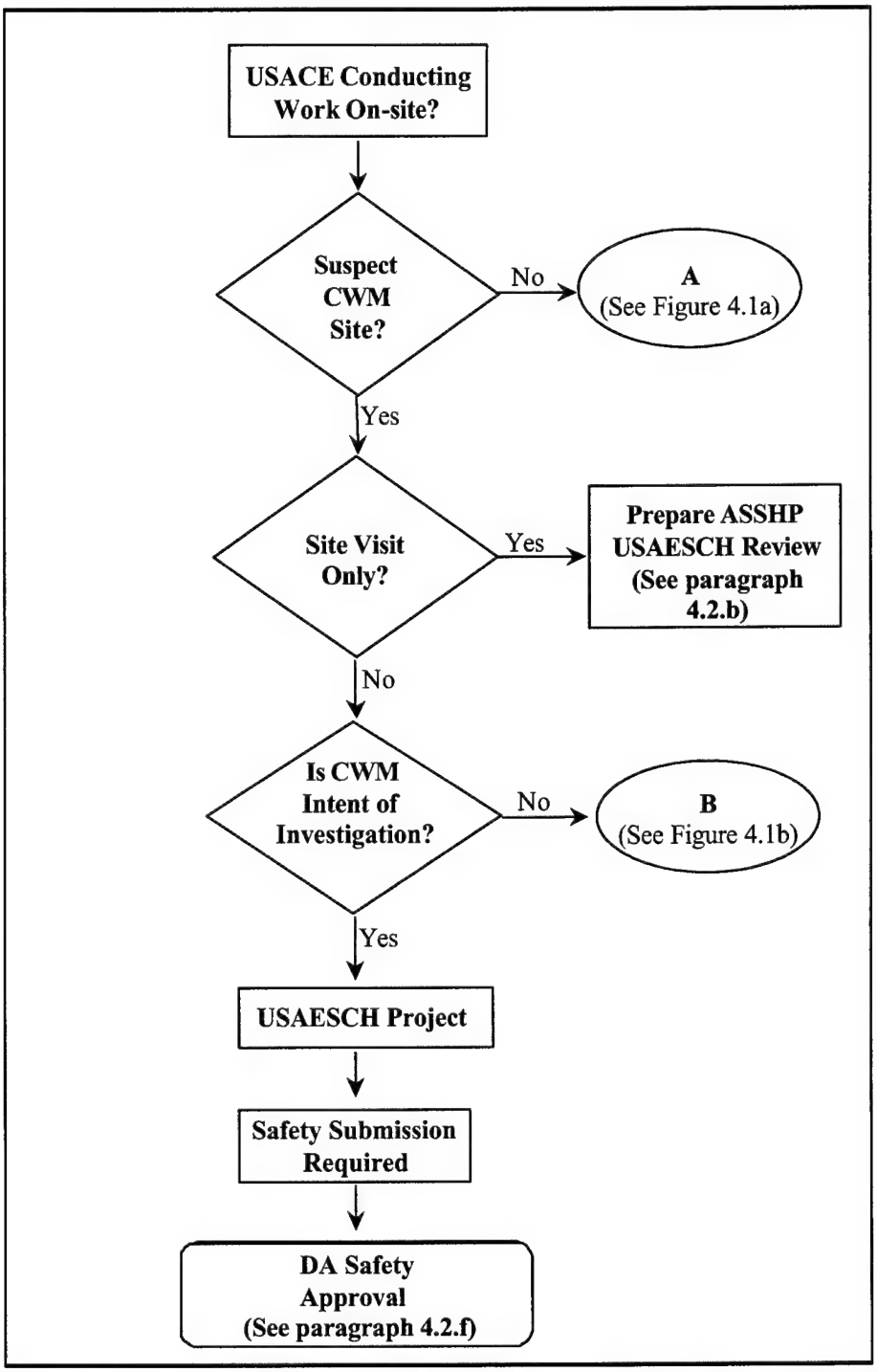


Figure 4-1. Process for Determining Which Safety and Health Plans and RCWM Requirements are Applicable to a RCWM Site

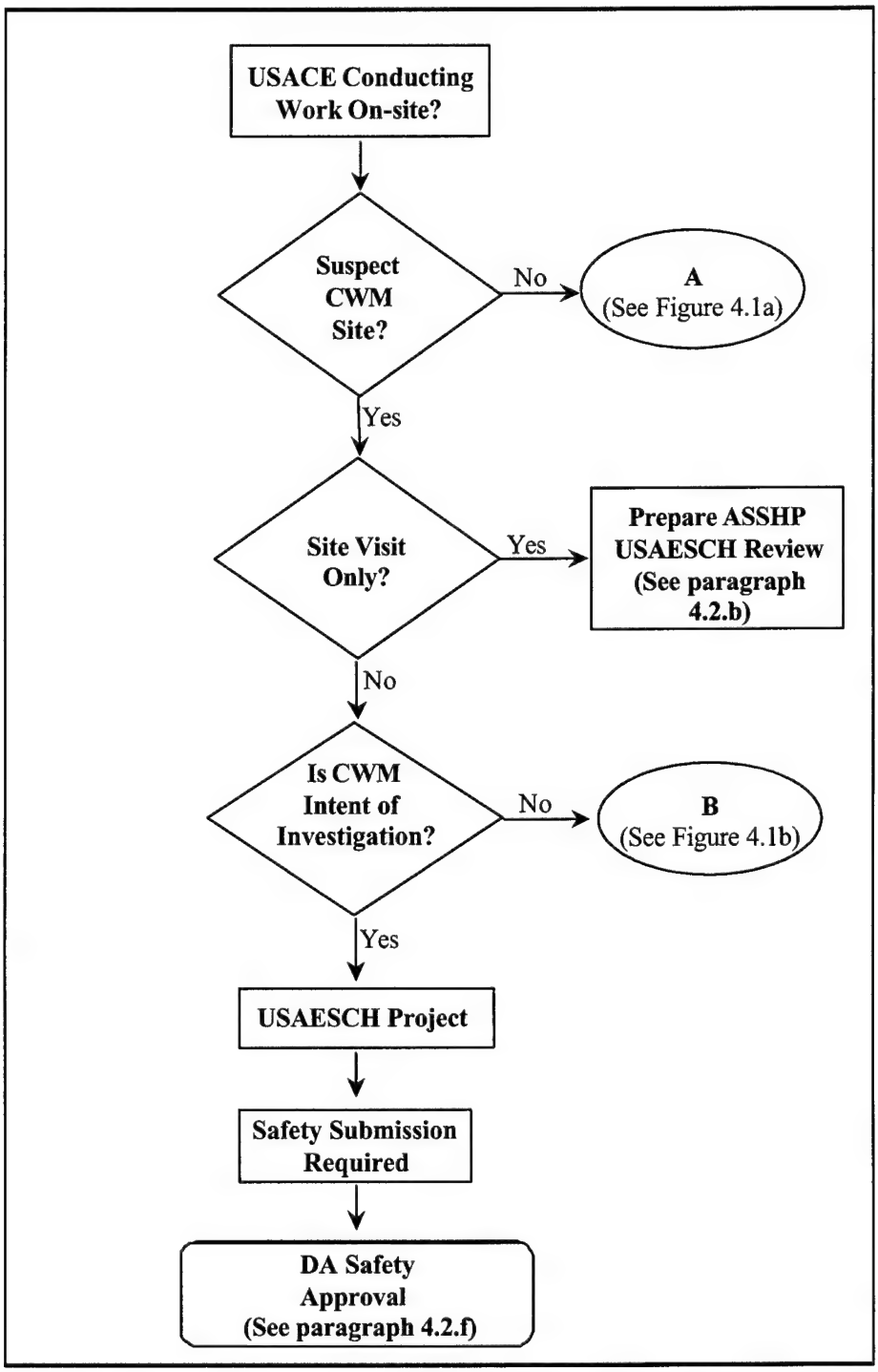


Figure 4-1. Process for Determining Which Safety and Health Plans and RCWM Requirements are Applicable to a RCWM Site

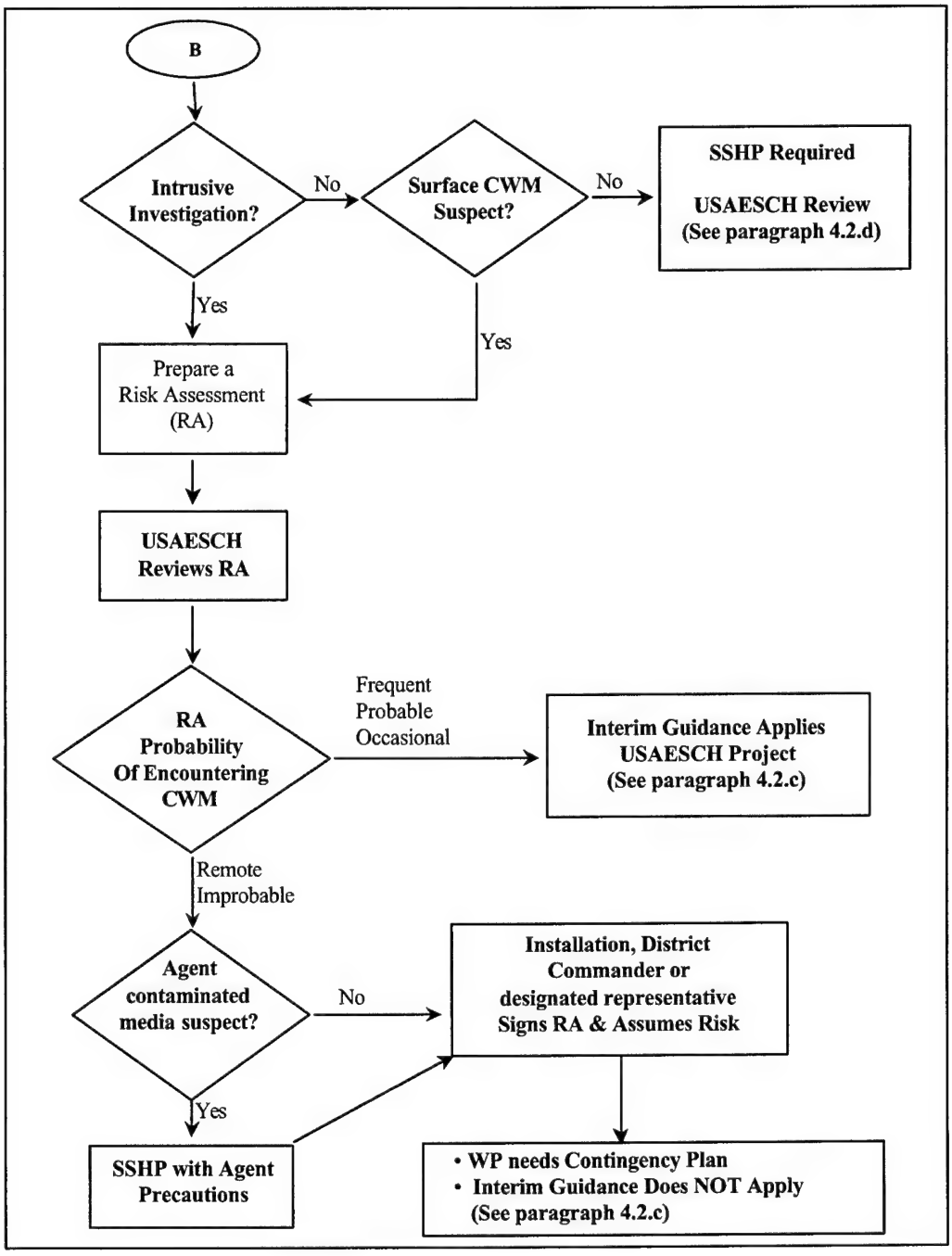


Figure 4-1b. Process for Determining Which Safety and Health Plans and RCWM Requirements are Applicable to a RCWM Site.

c. HTRW, Conventional OE or Construction Support on a Suspect RCWM Site.

(1) If the intent of the investigation on a RCWM site is not to remove the RCWM, but rather to mitigate either HTRW or conventional ordnance or to provide construction support, RCWM safety and health plans and requirements may not be required. The Interim Guidance for Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel Response Activities (Interim Guidance) discusses safety and health requirements on a RCWM site. However, it does not specifically address those situations when construction or an environmental response action other than a RCWM investigation or removal project is conducted at a site that is suspect of containing RCWM. To determine whether the Interim Guidance applies to the non-RCWM activities, a procedure (risk assessment) was developed and is contained in a HQDA Policy Memorandum, "Applicability of Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel Response Activity Interim Guidance", dated 19 Mar 1998. Any district or installation planning to conduct an environmental response action other than a RCWM project (i.e., investigation, removal, or construction support) on a suspect RCWM site must complete a risk assessment. The following paragraphs provide a summary of the risk assessment procedure.

(a) Determine the scope of the proposed site activities.

(b) Conduct a historical study (e.g., installation records, the PMNSCM Survey and Analysis report) and site investigation to determine previous site usage and the potential for encountering RCWM.

(c) Determine the probability of encountering RCWM during proposed site activities based on the scope of proposed site activities, previous site usage, and the potential for encountering RCWM. The probability must be documented; documentation will include the information used to determine the probability. In accordance with AR 385-10, the probability of encountering RCWM will be ranked in one of five categories:

- Frequent: Occurs very often, continuously experienced.
- Likely: Occurs several times.
- Occasional: Occurs sporadically.
- Seldom: Remotely possible; could occur at some time.
- Unlikely: Can assume will not occur, but not impossible.

(d) The completed risk assessment should be provided to USAESCH for review and comment. If the probability of encountering RCWM is determined to be seldom or unlikely, either the installation, District Commander, or designated representative must sign the risk assessment and assume the risk of conducting site activities as a non-RCWM site (i.e., the

Interim Guidance will not be implemented). This decision must be justified and documented in writing.

(2) If the district's risk assessment determines that the probability of encountering RCWM is seldom or unlikely, the following requirements apply.

(a) The safety and health plan for the proposed site activities must include contingency plans providing for a safe and expeditious response in the event RCWM is encountered. RCWM contingency plans will have the written concurrence of USAESCH-OE-CX and the installation and/or district safety and environmental offices, EOD and TEU, and from all Army agencies responsible for the work activities.

(b) Any time suspect RCWM is encountered, all work will immediately cease. Project personnel will withdraw along cleared paths upwind from the discovery. A team consisting of a minimum of two personnel will secure the area to prevent unauthorized access. Personnel should position themselves as far upwind as possible while still maintaining security of the area.

(1) On FUDS project sites, the UXO team will notify the local POC designated in the Work Plan. The local POC will facilitate EOD response and two personnel will secure the site until EOD's arrival. If the local POC designated in the Work Plan is not the local law enforcement agency, the local POC will inform the local law enforcement agency of the discovery, if necessary. The EOD unit will notify the TEU and secure the area until TEU's arrival. After notifying the local law enforcement agencies, the local POC will notify the USAESCH Safety Group to inform them of the actions taken.

(2) On active installations, the UXO team will normally notify the Range Control Officer, Facility Engineer, Post Headquarters or POC designated in the Work Plan. After notifying the Range Control Officer or POC, the local POC will notify the USAESCH Safety Office to inform them of actions taken.

(c) If the item is confirmed to be RCWM, all investigative and/or construction work will stop until RCWM plans and procedures are in place. All of the elements of the Interim Guidance and other relevant RCWM Army regulations will be implemented before work will commence. The PMNSCM, the TEU Commander, TEU and the installation (or district safety and environmental offices) will coordinate on implementing the Interim Guidance.

(3) If the district's risk assessment determines that the probability of encountering RCWM during site activities is frequent, probable or occasional, all of the requirements in the Interim Guidance apply and USAESCH must be involved in the project. The types of safety and health plans and procedures required are dependent on whether the site activities are classified as non-intrusive, anomaly avoidance, or intrusive, as discussed in the following sections.

d. Non-Intrusive Activities. If there is a high potential of encountering RCWM items on the surface during non-intrusive activities (e.g., geophysical mapping), a Safety Submission is

required (see paragraph f(1) below). Otherwise, an SSHP will be developed and approved by USAESCH. The SSHP will include all of the elements of an HTRW SSHP. The SSHP will address the requirements of 29 CFR 1910.120(b)(4), 29 CFR 1926.65(b)(4), ER 385-1-92, EM 385-1-1, and those requirements to be published in ER 385-1-95. The SSHP should include information on the agents that are suspect to be on-site and hazard communication information.

e. Investigative and Assessment Activities Utilizing Anomaly Avoidance. When anomaly avoidance is used for site investigation and assessment (e.g., soil and water sampling, or the installation of monitoring wells) an SSHP, approved by the OE MCX, is required. Additional precautions, as stated below, must also be met:

(1) The SBCCOM Surgeon must be consulted to determine what on-site and off-site medical support requirements are required. A complete discussion is presented in Paragraph 8-8. USAESCH will be the liaison with the SBCCOM Surgeon. All requests for support must go through the USAESCH Safety Office.

(2) Public Safety. A maximum credible event (MCE) must be determined and a no significant effects (NOSE) hazard zone must be calculated. In accordance with Army regulation, intrusive activities will not be conducted when unprotected or untrained personnel are within the NOSE.

(3) Additional information on anomaly avoidance activities is published in EP 75-1-2, UXO Support During HTRW and Construction Activities.

f. Response Activities with the Intent to Uncover, Characterize and/or Remove Geophysical Anomalies.

(1) Safety Submission.

(a) When anomaly avoidance is not used for site investigation or removal activities or the suspect item cannot be detected (e.g., surface removal of RCWM or excavation when the intent is to uncover, characterize and remove geophysical anomaly), a Safety Submission is required. The Safety Submission serves as the specifications for conducting work activities at the project site. It details the scope of the project, the planned work activities, the potential site hazards and the methods of controlling the hazards.

(b) The USAESCH OE Design Center is the only USACE office that is authorized to perform this work. The Safety Submission is prepared by USAESCH with input from other agencies and approved by the office of the Director of Army Safety. The Safety Submission is composed of the elements described below.

- Work Plan.
- SSHP.

- Supporting Plans.

(c) Chapter 7 presents a detailed discussion on the contents of the Safety Submission and chain-of-command for its approval. An outline of the Safety Submission may be found on the OE MCX website at http://www.hnd.usace.army.mil/oew/index.htm under contract DIDs, DID number OE-060.

(2) Additional precautions must also be met when performing intrusive activities on a RCWM site. In accordance with Army Regulations, intrusive activities will not be conducted unless:

(a) A risk analysis shows that the benefits justify the costs.

(b) The Army has the capability to handle the recovered RCWM.

(c) The NOSE has been calculated and the general public is protected.

(d) A tabletop exercise and pre-operational survey have been successfully completed.

(e) Medical support arrangements have been made.

(f) The Safety Submission has been approved.

(g) Calculation of most-probable-munition (MPM) and the requisite minimum separation distance (MSD) will be calculated for the project site.

4-3. Types of Removal Actions.

a. General. The purpose of a RCWM response action is to reduce, in a timely, cost-effective manner, the risk to human health, safety and the environment resulting from past DOD activities. The reduction of risk to the public and the environment is achieved through a RCWM removal action. A removal action includes all activities involved in the cleanup or removal of RCWM and/or chemical agent contaminated media from the environment to include preliminary work (e.g., the Preliminary Assessment of Eligibility and Site Inspection) and the disposal of removed materiel. This term includes, in addition, without being limited to, security fencing or other measures to prevent, minimize, or mitigate damage to the public health or welfare or to the environment.

b. Selection of Removal Action Type.

(1) The selection of the appropriate type of RCWM removal action is based on an evaluation of the following site-specific features:

(a) The nature of the RCWM contamination.

(b) The urgency/threat of release or potential release of RCWM.

(c) The timeframe required for initiating a removal action.

(2) Following the evaluation of the above features, either an emergency, time critical, or non-time critical removal action is selected. The USACE has been given execution authority at FUDS for Time Critical Removal Actions (TCRAs) and Non-Time Critical Removal Actions (NTCRAs) by the Army. EP 1110-1-18 discusses the circumstances under which each type of removal action is implemented.

4-4. Non-Time Critical Removal Actions for RCWM Projects.

a. This EP discusses the requirements for conducting a RCWM response project in accordance with the NTCRA process. NTCRAs are actions initiated in response to a release or threat of a release that poses a risk to human health or the environment where more than six months planning time is available. This EP will focus on the requirements for executing a NTCRA that are unique to RCWM projects. For those instances in which the NTCRA requirements for RCWM and OE are identical, a reference to EP 1110-18 is provided.

b. There are several formal steps required to execute a NTCRA. These steps are illustrated in Figure 4-2 and include:

(1) Preliminary assessment of eligibility (PAE) to determine property and project eligibility. Details for completing the PAE are provided in EP 1110-1-18.

(2) Site inspection (SI) to confirm the presence of RCWM at the site. Details for conducting the SI are provided in EP 1110-1-18.

(3) Approval Memorandum to authorize the execution of the Engineering Evaluation/Cost Analysis (EE/CA). The Approval Memorandum is discussed in EP 1110-1-18.

(4) EE/CA investigation to evaluate the site and risk, identify and evaluate removal alternatives, and select a removal action. The EE/CA is discussed in Chapter 5 of this document.

(5) Removal design to plan for the implementation of the removal action. The removal design is discussed in Chapter 6 of this document.

(6) Removal action. The removal action is discussed in Chapter 6 of this document.

(7) Project completion. The project completion process is discussed in Chapter 6 of this document.

c. During the NTCRA process, a TCRA may be conducted due to the discovery of an imminent danger. As shown in Figure 4-2, a TCRA may be initiated during the following phases

of a NTCRA: PAE, SI, EE/CA or removal action. Following the completion of the TCRA, the NTCRA will resume.

d. As illustrated in Figure 4-2, a decision of No DOD Action Indicated (NDAI) may be reached during the NTCRA process at the conclusion of the PAE, SI or EE/CA phases. At any time during the RCWM response process, the RCWM project team, in consultation with the OC supporting the OE MCX, may propose that a removal action be conducted based on site-specific circumstances. If the removal action will be conducted with a planning period of less than six months, the lead agency must publish the Action Memorandum within 60 days of initiating the removal action. Any information gathered during this response action must be incorporated into the EE/CA document. The OE MCX should be contacted for further information about the circumstances in which a removal action may be appropriate during the RCWM response process.

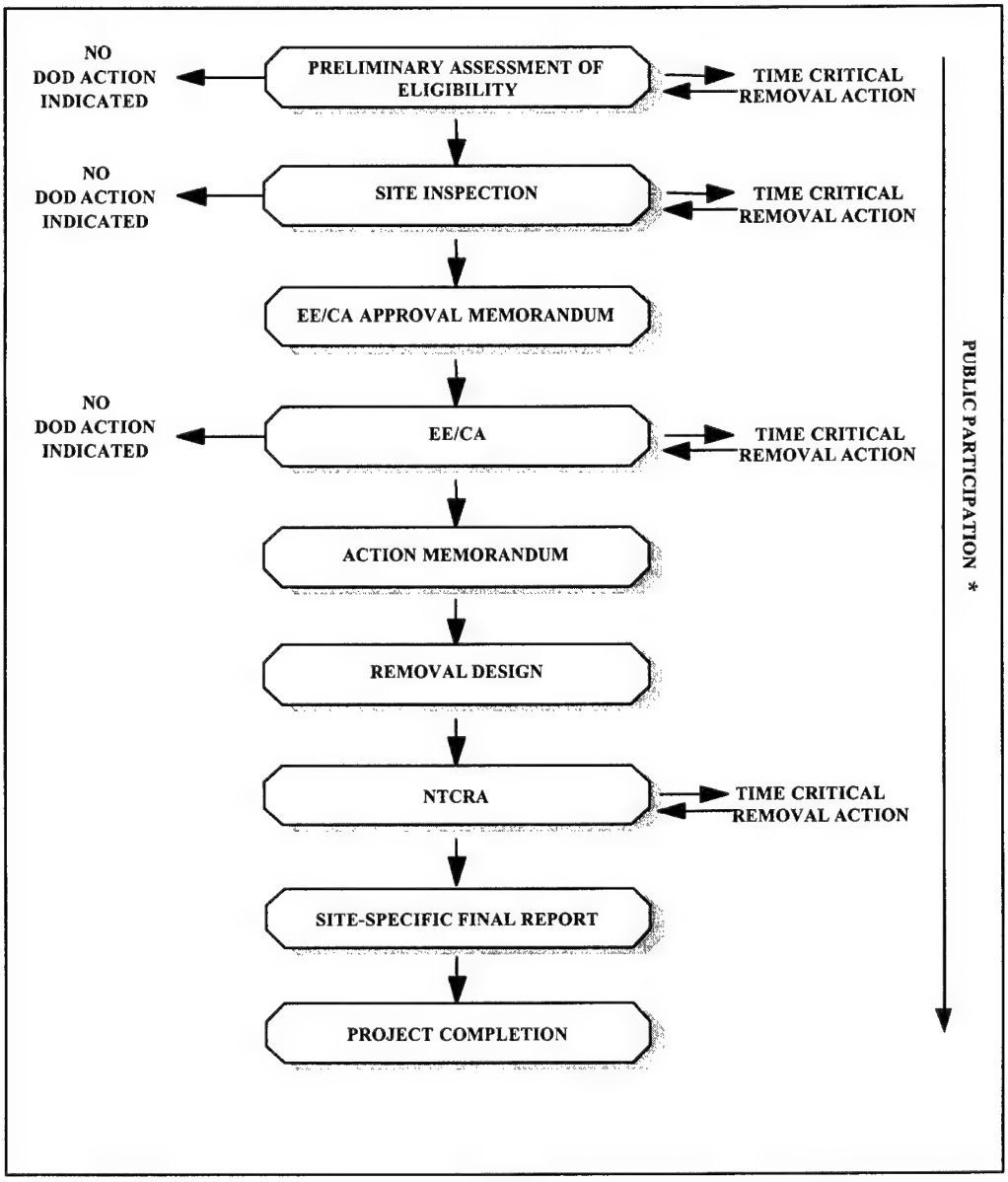


Figure 4-2. Non-Time Critical Removal Action Process. **

* Public Participation is an integral component of the NTCRA process.

**Additional removal actions may occur at any time depending on the exigencies of site conditions.

# CHAPTER 5
# ENGINEERING EVALUATION/COST ANALYSIS

## 5-1. Introduction.

a. This chapter presents an overview of the EE/CA phase of a RCWM response action. An EE/CA must be completed for all NTCRAs, as required by the NCP. The USAESCH OE Design Center is responsible for executing the EE/CA phase for RCWM projects.

b. The purpose of the EE/CA is to identify the most appropriate response action to address RCWM risk at a project site. The determination of the recommended response alternative occurs following the completion of a site characterization, risk assessment of RCWM hazards present at the site, and evaluation of potential response alternatives. The data generated to support the selection of a response alternative is presented in an EE/CA report. The components of the EE/CA phase are illustrated in Figure 5-1 and explained the paragraphs 5-2 through 5-9.

c. If an imminent hazard is discovered during the EE/CA phase, a TCRA may be initiated. Upon completion of the TCRA, the NTCRA process will resume. The TCRA process is discussed in Chapter 4 of this document and in EP 1110-1-18.

## 5-2. EE/CA Reconnaissance.

a. EE/CA Reconnaissance (RECON) is an optional task within the EE/CA phase. If implemented, the RECON task is the first element of the EE/CA phase. The decision to implement the RECON task is made by the RCWM project team on a project-by-project basis following an evaluation of the site-specific data gathered during the PAE and SI phases. The government or its contractor(s) may complete the RECON task. Additional information on the objectives and components of the RECON task are discussed in EM 1110-1-4009

## 5-3. EE/CA Planning and Coordination.

The EE/CA planning and coordination process includes the preparation of the EE/CA SOW, independent government estimate (IGE), and schedule; completion of a site visit; preparation and approval of all required planning documentation; and fulfillment of the project management, regulatory, real estate and public participation requirements.

a. Preparation of the EE/CA SOW. The site-specific data gathered during the PAE, SI, and RECON (if implemented) is used to prepare the EE/CA SOW. The RCWM project team will manage the preparation of the SOW and ensure that all applicable technical disciplines are appropriately involved. Since safety is a primary concern during RCWM response projects, the EE/CA SOW must be closely coordinated with the project OE Safety Specialist. Additionally,

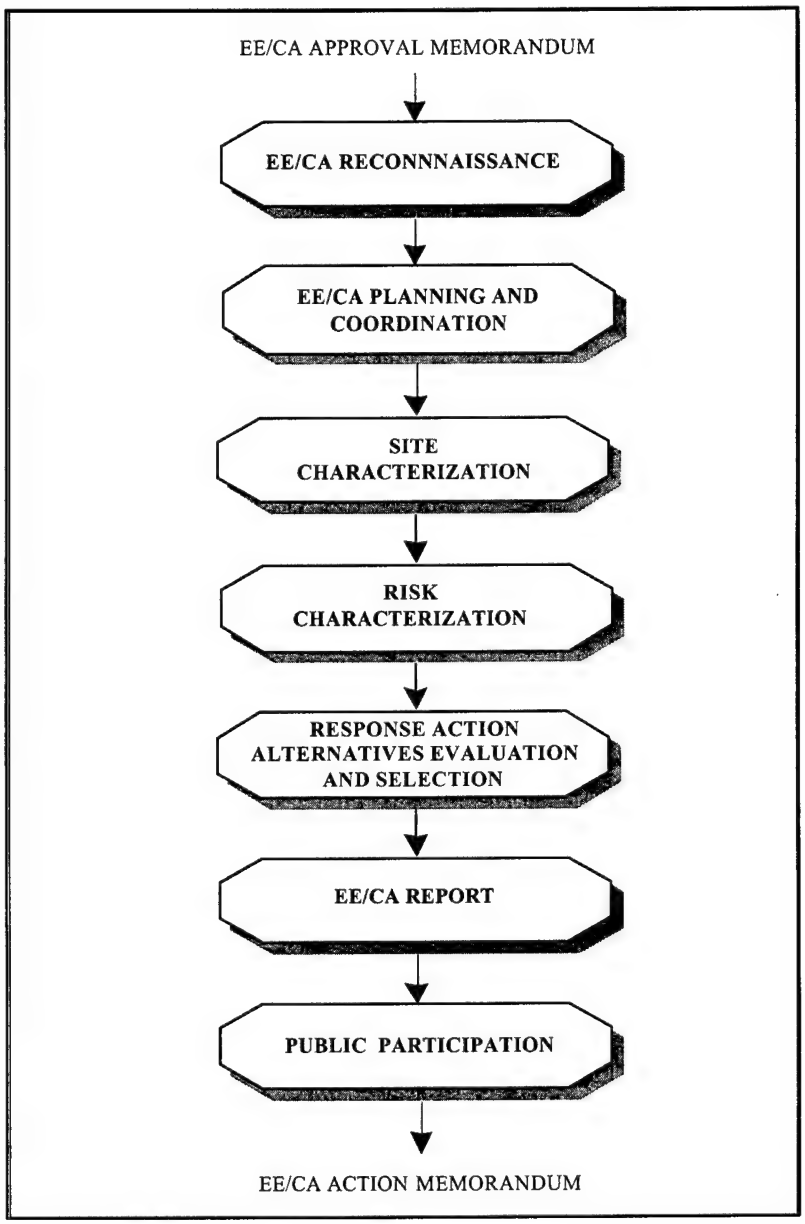


Figure 5-1. EE/CA Process

the OE MCX may be consulted to provide the appropriate statements concerning the background or authority for the task order's award. An example EE/CA SOW is provided on the OE MCX website at http:www.hnd.usace.army.mil/oew/contreq.htm.

b. Preparation of the IGE. The IGE for an EE/CA will be prepared in accordance with the guidance provided in EP 1110-1-18.

c. Site Visit.

(1) If the EE/CA contractor performed the RECON task, then a site visit should not be necessary. However, if a RECON was not included in the contractor's SOW, then the EE/CA contractor will conduct a site visit.

(2) Site Visit SOW. The site visit may be authorized as either a purchase order or as the first task of an incrementally funded contract. Sample SOWs for the stand-alone site visit and the site visit included as a task in a larger task order may be located on the OE MCX website at http:www.hnd.usace.army.mil/oew/contreq.htm.

(3) Purpose. The purpose of the site visit is to provide the contractor with the opportunity to gather pertinent information for use in preparing the Work Plan and other planning documents. The information collected from the site visit allows the contractor to gain a better understanding of the nature and extent of RCWM contamination and verify the locations of the proposed areas of interest. This information, which is instrumental in planning the EE/CA, includes:

(a) Site features, such as terrain, soil type, access, and amount of brush clearance required.

(b) Location of / coordination with nearest hospital.

(c) Location of / coordination with nearest fire station.

(d) Coordination with local airport/ Federal Aviation Administration representatives.

(e) Coordination with local police, sheriff, and/or military police to assess security.

(f) Fencing requirements for explosives storage magazines.

(g) Location for support zone and explosive storage magazines if applicable.

(h) Location of the IHF, if applicable.

(i) Logistical coordination for lodging, equipment and vehicle rental, office space, explosives dealers, etc.

(j) Coordination with Range Control, Defense Reutilization Management Office, Ammunition Supply Point, and Post Provost Marshal, if applicable.

(k) Coordination with TEU, ECBC, PMNSCM, and the district for support activities during field investigations, as applicable.

(4) Site Visit Requirements. The following paragraphs present requirements that should be fulfilled for the site visit:

(a) Prior to the site visit, the contractor will be provided with copies of the ASR and any other site-specific information for review.

(b) An ASSHP will be prepared and submitted to the OE Safety Manager or appointed designee prior to visiting the site. The ASSHP will be prepared using the format provided on the OE MCX website at http:www.hnd.usace.army.mil/oew/policy/regpro.html as Appendix H to EP 1110-1-18.

(c) Generally, no more than three contractor personnel are required to participate. One contractor participant must be a project manager and one must be a qualified Senior UXO Supervisor.

(d) Since the site visit will be non-intrusive and anomaly avoidance techniques will be implemented, site visit participants are not required to have Hazardous Waste Operations (HAZWOPER) training.

(e) The district will coordinate with the property owner/operator prior to the site visit if a ROE is required.

(f) A site visit for a typical project should take no longer than five days, including travel time.

d. Preparation of Planning Documents. A Safety Submission may be required prior to beginning work at the RCWM site (see Chapter 4). The Safety Submission is composed of the Work Plan, SSHP, and Supporting Plans. These elements of the Safety Submission are discussed in detail in

Chapter 7 of this document. If a Safety Submission is not required, a Work Plan and Safety Plan will still be required to conduct field activities.

(1) Work Plan. A site-specific Work Plan is required for all EE/CA projects. The Work Plan documents the methodology that will be used to complete the EE/CA. Following the site visit, the Work Plan will be developed in accordance with the SOW. The contents of an EE/CA Work Plan, including sub-plans, are discussed in this chapter.

(2) SSHP. The contractor will also prepare a SSHP in accordance with the guidance provided in Chapter 7 of this document.

(3) Supporting Plans. If a Safety Submission is required, the following supporting plans will be prepared in accordance with Chapter 7 of this document: TEU Assessment Plan, ECBC Air Monitoring and Analysis Plan, Public Evacuation or Shelter-in-Place Plan, and PMNSCM Plans.

(4) Public Affairs, Real Estate and Regulatory Requirements. During the EE/CA planning and coordination process, the district PM must ensure that all applicable public affairs, real estate, and regulatory requirements, as discussed in EP 1110-1-18 and EP 1110-3-8, have been satisfied. Additionally, the applicable safety and training requirements, as specified in Chapter 8 of this document must be fulfilled.

(5) Anomaly Review Board. The district PM may also consider the establishment of an Anomaly Review Board (ARB). An ARB is only used in exceptional circumstances. Information on ARB procedures is provided in EP 1110-1-18.

5-4. Site Characterization.

a. Overview.

(1) In general, RCWM sites are comprised of disposal pits and test trenches, and to a lesser extent, impact ranges. The purpose of a RCWM site characterization is to obtain surface and subsurface RCWM data to characterize the site and to generate recommendations for the proposed RCWM response action. This characterization should include any data from any RCWM that has been located and/or disposed of by EOD or local law enforcement. Potential sources for this data include the ASR, EOD records, or local law enforcement records. The following types of data should be collected:

(a) Type of RCWM or RCWM-related activities.

(b) Location of RCWM or RCWM-related activities, including location of pits or trenches.

(c) Density of RCWM munitions for impact areas.

(d) Penetration depth of RCWM munitions for impact areas.

(2) The components of the site characterization phase include:

(a) Implementation of the sampling methodology.

(b) OE detection instrument testing, if not completed during the RECON task.

(c) Area preparation.

(d) Field sampling.

b. Statistical Tools. During an EE/CA site characterization, the following statistical tools may be used to collect site-specific data for impact areas: SiteStats/GridStats or UXO calculator. Contact the OE MCX for additional detail on these statistical tools.

(1) SiteStats/GridStats. SiteStats may be used during sampling efforts to aid in establishing the boundaries of contaminated areas and estimating the density of contamination within an area. SiteStats provides for sequential sampling procedures and a statistical determination of sampling termination points. SiteStats accepts a small amount of uncertainty in characterizing individual subareas (grids) in exchange for a much greater understanding of the contamination of the overall site. GridStats provides a statistical sampling methodology for estimation of ordnance contamination density within individual grids.

(2) UXO Calculator. The UXO Calculator is a statistical model for determining the amount of UXO in a sector. The UXO Calculator assumes homogeneous OE contamination within an identified area. It is used to determine statistical confidence intervals for UXO density and to perform statistical tests concerning UXO densities.

(3) Other. Other statistical methods that are agreed to by stakeholders, documented and approved.

c. OE Detection Instrument Testing. OE detection instruments should be field tested prior to each project to ensure their applicability to the unique geographical characteristics of the site. If the RECON task is included in the EE/CA process, the OE detection instrument with the best documented performance for reasonable cost should be selected for the EE/CA field investigation. If the RECON task was not included in the EE/CA process, then the contractor should complete OE detection instrument testing as part of the initial field effort. The procedures for OE detection instrument testing are described in EM 1110-1-4009.

d. Area Preparation. Area preparation includes the identification and marking of geophysical sampling grids and the removal of sufficient vegetation and other obstacles which may restrict sampling efforts.

(1) Location Surveys and Mapping. Location surveys and mapping will be performed by the contractor to establish the boundaries of the areas under investigation. The procedures to be used in the execution of location surveys and mapping are discussed in EM 1110-1-4009.

(2) Brush Clearance.

(a) Prior to conducting any field sampling, brush clearance may be required. The purpose of brush clearance is to remove sufficient vegetative growth from the areas to be investigated in order to effectively locate, investigate, and remove subsurface anomalies.

(b) The vegetation removal techniques used must be coordinated with the district environmental staff and documented in the Work Plan. A UXO Technician II must always escort the brush clearing crew in areas not previously cleared of OE. The safety requirements listed in EM 385-1-1 must be followed. PPE will be provided to the brush clearance crew and used as required for protection. All brush clearance personnel must be trained in the safe operation of the equipment and have obtained site-specific safety training in accordance with Chapter 8 of this document.

e. Field Sampling. During the field sampling, surfaced and/or subsurface sampling are conducted to obtain the data necessary to conduct an accurate EE/CA investigation.

(1) Surface Sampling. The UXO personnel will visually inspect the site investigation area; identify grids; and locate any suspect RCWM items. TEU will assess, package, and transport each RCWM or suspect RCWM item to the IHF. The contractor will assist TEU as needed.

(2) Subsurface Sampling.

(a) Prior to the subsurface sampling effort, the contractor will perform a geophysical survey to locate subsurface anomalies. The procedures for conducting OE detection surveys are discussed in Chapter 6 of this document. RCWM or suspected RCWM identified by the OE sampling protocol will be intrusively investigated. Only approved UXO personnel or TEU will perform intrusive operations. RCWM removal actions will proceed in accordance with the approved Safety Submission.

(b) Once a suspect RCWM item has been exposed, TEU will assess, package, and transport the RCWM or suspect RCWM item to the IHF. The contractor will assist TEU as needed.

(c) If a suspect RCWM item is removed, then the excavated location will be rechecked with a magnetometer or other ordnance detector. Upon completion of the recheck, if the location does not

produce another anomaly, the excavated area will be sampled in accordance with Chapter 9 to determine if residual chemical agent contamination is present. If the area is determined to be uncontaminated, the area may be backfilled with clean soil. If the sample is contaminated with chemical agent, the on-site OE Safety Specialist will be notified.

(d) Evacuations are sometimes necessary when conducting intrusive investigations to minimize the risk of the operation. An exclusion zone distance is calculated to ensure that all non-essential personnel are outside of that distance during the conduct of the excavation. The exclusion zone distance may be reduced by implementing engineering controls.

(e) There are several other considerations, which must be accounted for during the intrusive investigation, including: engineering controls, exclusion zone management, and quality assurance. These topics are discussed in detail in later chapters of this pamphlet.

5-5. Engineering and Operational Controls.

a. Engineering controls are used to improve personnel safety and/or to reduce the exclusion zone during removal operations. If an engineering control design is required to reduce an exclusion zone due to fragmentation concerns, the USAESCH OE Design Center should be contacted for design approval by the USAESCH Engineering Directorate, Structural Branch. Examples of engineering controls for vapor containment for RCWM activities include:

(1) The use of environmental structures to reduce or contain the agent should a release occur (e.g., Vapor Containment Structure). This is usually accompanied by the use of an approved air filtration system to capture the agent vapors.

(2) Filtered Shelter (other than the Vapor Containment Structure).

b. Operational Controls. Examples of operational controls for RCWM are described below.

(1) RCWM operations should be performed during the hours of daylight.

(2) Certain temperatures can reduce the rate of release of agents. For example, H agent, or mustard, becomes a solid at temperatures below 57° Fahrenheit. If the chemical agent of concern was mustard on the project site, operations could be restricted to periods when the temperature would be below that temperature, thereby reducing the NOSE. Even at temperatures below 57° Fahrenheit, if the MCE is an ammunition round, explosively configured, containing H agent and the round functioned as designed, there would be a NOSE due to the release of agent caused by the heat generated by the explosion.

(3) Wind speed has a direct effect on downwind hazard distances. Normally the higher the wind speed, the more air turbulence exists, thereby reducing the downwind distance of the agent plume. Therefore, operations could be restricted unless the wind speed is at or above a certain level.

(4) Atmospheric stability. The time of day, the strength of sunlight (if any) in the area, the extent of cloud cover, and the wind velocity all play major roles in determining the level of turbulence in the atmosphere. Turbulence is the extent of "mixing" in the atmosphere. These factors determine distances downwind over which airborne contaminants will remain hazardous. Meteorologists typically divide atmospheric conditions into six atmospheric stability classes that generally range from "A" to "F". Class A represents unstable conditions under which there is strong sunlight, clear skies, and high turbulence in the atmosphere. These conditions promote rapid mixing and dispersal of airborne contaminants. At the other extreme, atmospheric stability Class F represents light steady winds, nighttime skies, and low level of turbulence in the atmosphere. Airborne contaminants mix and disperse much slower with air under these conditions.

5-6. Environmental Sampling and Analysis. Soil samples should be obtained from locations, which could potentially have been contaminated with RCWM or decontamination procedures. Soil samples should be obtained at intervals justified in the approved Work Plan. Sampling and analysis may also be required for investigative derived waste (IDW). Detailed information on environmental sampling and analysis is provided in Chapter 9 of this document.

5-7. Institutional Analysis.

a. Purpose. An institutional analysis should be conducted to show what opportunities exist to implement an institutional control program at a specific site (see Chapter 2 of EP 1110-1-24 for a discussion on overview of institutional controls and their relationship to land use controls). The institutional analysis also identifies the existence of any local, state, Federal, or private agencies that may be available to assist in the implementation or maintenance of the institutional controls program. An institutional analysis is necessary in order to evaluate whether institutional controls are viable at a particular site as a stand-alone response action or as a supplement to other cleanup activities. The institutional analysis will also aid in developing the most effective institutional control program, if it is selected as the response alternative or as part of a response alternative.

b. Components.

(1) There are five elements of an institutional analysis which should be evaluated for each local, state, federal or private agency that may be able to assist in the implementation or monitoring of a proposed institutional controls program. These elements include:

(a) Jurisdiction of the agency.

(b) Authority exercised by the agency within its jurisdiction.

(c) Mission of the agency.

(d) Capability of the agency.

(e) Desire of the agency to implement the institutional control being considered.

(2) For additional information on the application of institutional controls for the EE/CA process, refer to EP 1110-1-24.

c. Determination of Existing Institutional Controls. The existence of any current deed restrictions or other type of institutional control that may have been placed on the property in the past as a result of some other activity should be determined. If such restrictions are found to already exist at a site, it may be easier to modify the existing restriction to address the OE risk than to implement an entirely new institutional control.

5-8. Risk Characterization.

a. Purpose. A risk characterization is required as part of the EE/CA process. A risk characterization of a RCWM site is conducted to determine the level of safety risk that exists at a site as a result of the RCWM contamination. The risk characterization is a key component in determining the type of response necessary to address the safety risk and the basis on which subsequent cost-benefit analyses are conducted in the EE/CA.

b. Types of Risk Characterization Tools. Typically, a qualitative risk characterization tool is used during RCWM projects. For additional information on the selection of risk characterization tools, contact the OE MCX.

5-9. Development and Evaluation of Response Action Alternatives.

a. Development of Response Action Alternatives. Once site-specific data has been gathered and analyzed, potential site-specific response action alternatives will be developed. A response action alternative may include physical OE removals, as well as any other alternatives that reduce risk to the public. The alternatives will be developed based on existing site conditions, historic use of the site, the existing or proposed land use, and the extent and depth of OE. Site-specific alternatives must ensure the most effective use of resources, while providing maximum return to the public.

b. Response Action Categories. Response action alternatives are classified into four general categories: NDAI, Institutional Controls, Surface Clearance, and Subsurface Clearance. A proposed response action may include a combination of these alternatives.

(1) No DOD Action Indicated. This response action involves the continued use of the site in its current condition. An NDAI may be appropriate if some removal action has already occurred at the site or sector of the site or if the risk evaluation has determined that there is a very low-level of safety risk.

(2) Institutional Controls. Institutional controls may be used either as a stand-alone response action or as a supplement to other cleanup activities in order to address the residual risk that remains at a site after a response action has been completed. Institutional controls are a response action alternative used to restrict access to the site. Access can be restricted by either imposing administrative restrictions and/or by installing physical barriers. Administrative restrictions could take the form of a deed restriction limiting the future use of the parcel or requiring that precautions be taken during any future construction activities. Physical barriers may involve fencing and posting the area to ensure that the local populace does not enter the property and inadvertently come into contact with RCWM. For additional information regarding institutional controls, refer to EP 1110-1-24.

(3) OE Surface Clearance. The OE surface clearance alternative includes the investigation and removal of all potentially hazardous OE items IAW EP 1110-1-18. An OE surface clearance alternative may be recommended for a site based on the nature and extent of the OE contamination, the current and projected use of the site, and local community and regulatory acceptance of the alternative. An OE surface clearance must be performed by UXO-qualified personnel.

(4) OE Subsurface Clearance.

(a) The subsurface OE clearance alternative includes the investigation and removal of all potentially hazardous OE items to a certain depth at a site. The depth of the OE clearance is based on the nature and extent of the OE contamination, the current and projected use of the site, and local community and regulatory acceptance of the proposed alternative. When there is insufficient data to develop site-specific clearance depths, refer to DOD 6055.9-STD, Ammunition and Explosives Safety Standards, for subsurface clearance default depth. However, it is more cost effective to develop site-specific clearance depths based on current and future use of the site and the actual depth of OE found during the EE/CA investigation.

(b) An OE subsurface clearance is typically conducted using geophysical instruments to map the subsurface conditions and to determine the locations of anomalies that may be buried OE items. Upon completion of the geophysical survey and an analysis of the data, UXO-qualified personnel perform intrusive investigations to determine the nature of the geophysical anomalies.

c. Evaluation of Response Action Alternatives. Once the cleanup objectives have been established for a site, the various response action alternatives developed in the EE/CA must be evaluated in terms of how well they will meet these objectives.

(1) Three general evaluation categories are used to evaluate the proposed response action alternatives: effectiveness, implementability, and cost. The following paragraphs and Table 5.1 provide criteria which should be considered in the evaluation of each response action alternative.

(a) Effectiveness. The effectiveness of each response action alternative is evaluated based on its level of protection of human health and the environment, compliance with ARARs, and its ability to achieve the response action objectives. The effectiveness category is divided into four evaluation criteria:

- Overall Protection to Human Health and the Environment.
- Compliance with ARARs.
- Long-Term Effectiveness.
- Short-Term Effectiveness.

(b) Implementability. The implementability of each response action alternative is evaluated based on the following evaluation criteria including:

- Technical Feasibility.
- Administrative Feasibility.
- Availability of Services and Materials.
- Stakeholder Acceptance.

(c) Cost. The cost of each response action alternative is based on:

- Capital Costs.
- Post Removal Site Control Costs.

d. Comparative Analysis of Response Action Alternatives. Those alternatives which still appear feasible after the evaluation described above are then compared to each other using the same evaluation criteria described above. During this comparative analysis, the alternatives are ranked and the recommended response action alternative is selected.

Table 5.1

Criteria to Be Considered During Evaluation of Response Action Alternatives

| Evaluation Category | Criteria to be Considered |
|---|---|
| Effectiveness | • Protectiveness:<br>– Protective of public health and community<br>– Protective of workers during implementation<br>– Protective of the environment<br>• Complies with ARARS<br>• Long Term Effectiveness<br>• Short Term Effectiveness |
| Implementability | • Technical Feasibility:<br>– Construction and operational considerations<br>– Demonstrated performance/useful life<br>– Adaptable to environmental conditions<br>– Can be implemented in 1 year<br>• Administrative Feasibility:<br>– Permits required<br>– Easements or right-of-ways required<br>– Impact on adjoining property<br>– Ability to impose institutional controls<br>• Availability of Services and Materials:<br>– Equipment<br>– Personnel Services<br>– Outside laboratory testing capacity<br>– Off-site treatment and disposal capacity<br>– Post removal site control<br>• Stakeholder Acceptance |
| Cost | • Capital Cost<br>• Post-removal site control cost |

5-10. EE/CA Report. The EE/CA Report documents the methodologies used during the site characterization and presents the findings of the EE/CA evaluation. The EE/CA Report is a flexible document tailored to the scope, goals, and objectives of the NTCRA process. It should contain only those data necessary to support the selection of a response alternative and future five-year recurring reviews. Existing documentation should be relied on whenever possible. A sample format for an EE/CA Report is presented in EP 1110-1-18.

a. The EE/CA Report is executed and approved by the USAESCH OE Design Center. The EE/CA Report is reviewed by the district and the OE MCX.

b. Explosives Safety Submission (ESS) Requirement During the EE/CA Process.

(1) An ESS is typically prepared as part of the removal action planning process, as discussed in EP 1110-1-18. However, an ESS is also prepared if the Draft EE/CA Report recommends the response action alternative of either NDAI or Institutional Controls. Examples of the content and format of an NDAI ESS and Institutional Controls ESS are available in EP 1110-1-18.

(2) Both the NDAI ESS and Institutional Controls ESS must receive concurrence from the USATCES and the Department of Defense Explosives Safety Board (DDESB). Once the ESS has been approved, and all other comments on the Draft EE/CA have been incorporated, the Final EE/CA Report may be prepared.

5-11. EE/CA Public Participation and Approval Process.

a. Once the EE/CA Report has been prepared and reviewed by the USAESCH OE Design Center, the OE MCX, the district, and other stakeholders, the EE/CA becomes part of the Administrative Record for the site. The EE/CA is made available for public review and comment. A formal 30-day (minimum) public comment period is required, during which time public meetings may be held to discuss the results of the field investigation and the alternative selection process. For additional information regarding public participation requirements refer to EP 1110-3-8.

b. Upon completion of the public comment period, a responsiveness summary is prepared that discusses any significant public comments received and the actions taken to address those comments. The responsiveness summary becomes part of the Administrative Record.

c. Once the comments received during the public comment period have been incorporated into the EE/CA, the final EE/CA, along with the responsiveness summary, become part of the Administrative Record for the site.

d. If OE remains or is suspected to remain after completion of a response action, the property owner(s) will be apprised through the Administrative Record or other written agreements and all documentation will be annotated accordingly.

5-12. Action Memorandum.

a. The Action Memorandum is a concise document that identifies the response action chosen for implementation at a site. The Action Memorandum may also reserve the appropriate funding needed for the proposed response action. An Action Memorandum is required prior to implementation of TCRAs and NTCRAs.

b. As the primary decision document for the RCWM response action, the Action Memorandum serves the following functions:

(1) Substantiates the need for the response action.

(2) Identifies the proposed action.

(3) Explains the rationale for the response action selection.

(4) Documents that the appropriate process was followed in the selection of the response action.

c. Additional information on the applicability of the Action Memorandum, its format, and the review and approval process is discussed in EP 1110-1-18.

# CHAPTER 6
# RCWM DETECTION, REMOVAL AND COMPLETION

6-1. Introduction. This chapter provides information on the RCWM removal process and project completion procedures.

6-2. Removal Design.

a. The USAESCH OE Design Center is responsible for the removal design in coordination with the PM.

b. Instead of completing a formal removal design, USACE typically performs the tasks associated with removal design during the development of the SOW and Safety Submission for the removal action. The level of detail for the removal design phase is dependent on the complexity of the work to be performed and the type of contract to be utilized.

c. The purpose of the removal design process is to describe the technical details of how the removal action will be performed. The removal design process includes the following components, which are illustrated in Figure 6-1 and discussed below:

(1) Preparation of the removal action SOW and IGE. The USAESCH OE Design Center is responsible for executing and approving the OE removal action SOW and IGE. SOW and IGE quality excellence will be accomplished through the conscientious, cooperative efforts of each design team member. The district reviews the SOW and IGE and provides comments. Additional information on the SOW and IGE are provided in EP 1110-1-18.

(2) A site visit to gather additional information on the nature and extent of contamination at the site may be required. The site visit is conducted to provide the contractor with the opportunity to gather pertinent information for use in preparing the cost estimate and project planning documents. Detailed information on the site visit is provided in EP 1110-1-18.

(3) The preparation of planning documentation (e.g., Safety Submission) and completion of all coordination tasks prior to the Notice-to-Proceed will be necessary for the removal action. A Safety Submission is required when anomaly avoidance is not used for removal activities or the suspect item cannot be detected. The Safety Submission will be prepared and approved in accordance with the requirements found in Chapter 7 of this pamphlet. An outline of the Safety Submission may be found on the OE MCX website at http://www.hnd.usace.army.mil/oew/policy/dids/didindx.html under DID OE-060.

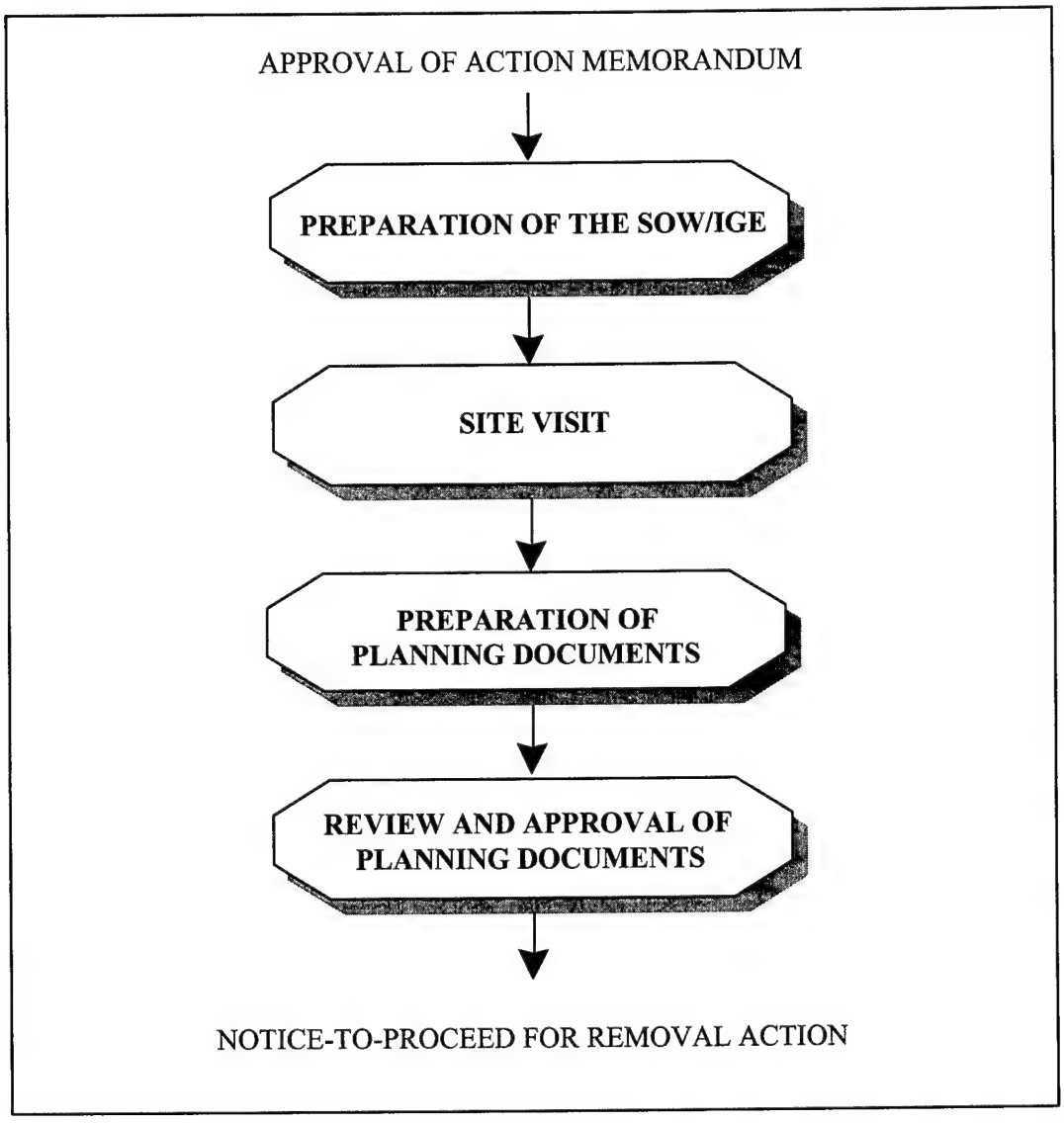


Figure 6-1. Removal Design Process

6-3. RCWM Detection and Removal.

a. Introduction. The RCWM Removal phase begins following the receipt of the Notice-to-Proceed. The removal action is intended to permanently and comprehensively address both short and long-term health and safety hazards at RCWM contaminated sites. The removal action may be implemented using active duty military personnel, DOD civilian personnel, private contractors, or a combination of the three. The implementing agency will be responsible for full coordination for all activities, including procurement, funding, scheduling, and authorizations. The removal action phase is composed of the following tasks, which are illustrated in Figure 6-2 and discussed in paragraphs 6-3b through 6-3i.

b. Location Surveys and Mapping. Location surveys and mapping will be performed by the UXO contractor to establish boundaries of the areas under investigation. The procedures for the execution of location surveys and mapping are discussed in EM 1110-1-4009.

c. Area Preparation.

(1) Prior to the initiation of a RCWM removal action, brush clearance may be required. The purpose of brush clearance is to reduce or remove the vegetative growth from the work areas in order to effectively locate, investigate, and remove surface and subsurface RCWM.

(2) The areas cleared and techniques used must be coordinated with the district environmental staff and documented in the Work Plan. A UXO Technician II must always escort the brush clearing crew in areas not previously cleared of OE. The safety requirements in EM 385-1-1 must be followed. PPE will be provided to the brush clearance crew and used as required for protection. All brush clearance personnel must be trained in the safe operation of the equipment and must have obtained site-specific safety training in accordance with Chapter 8 of this document.

d. RCWM and Chemical Agent Contaminated Media Surface Removal. RCWM surface removals are conducted to remove all RCWM from the surface of the work area. UXO-qualified personnel will flag, identify, and record the approximate location of all suspect RCWM items. TEU is responsible for assessing the item, packaging and transporting the item to the IHF in accordance with the approved Safety Submission. The contractor will assist TEU as needed. In addition, the contractor will perform environmental sampling in accordance with Chapter 9 of this document to verify that no residual chemical agent contamination remains after the removal of all suspect RCWM items. Also, the contractor will remove all chemical agent contaminated scrap and non-RCWM related materials that may interfere with the geophysical investigation and store them for later disposition.

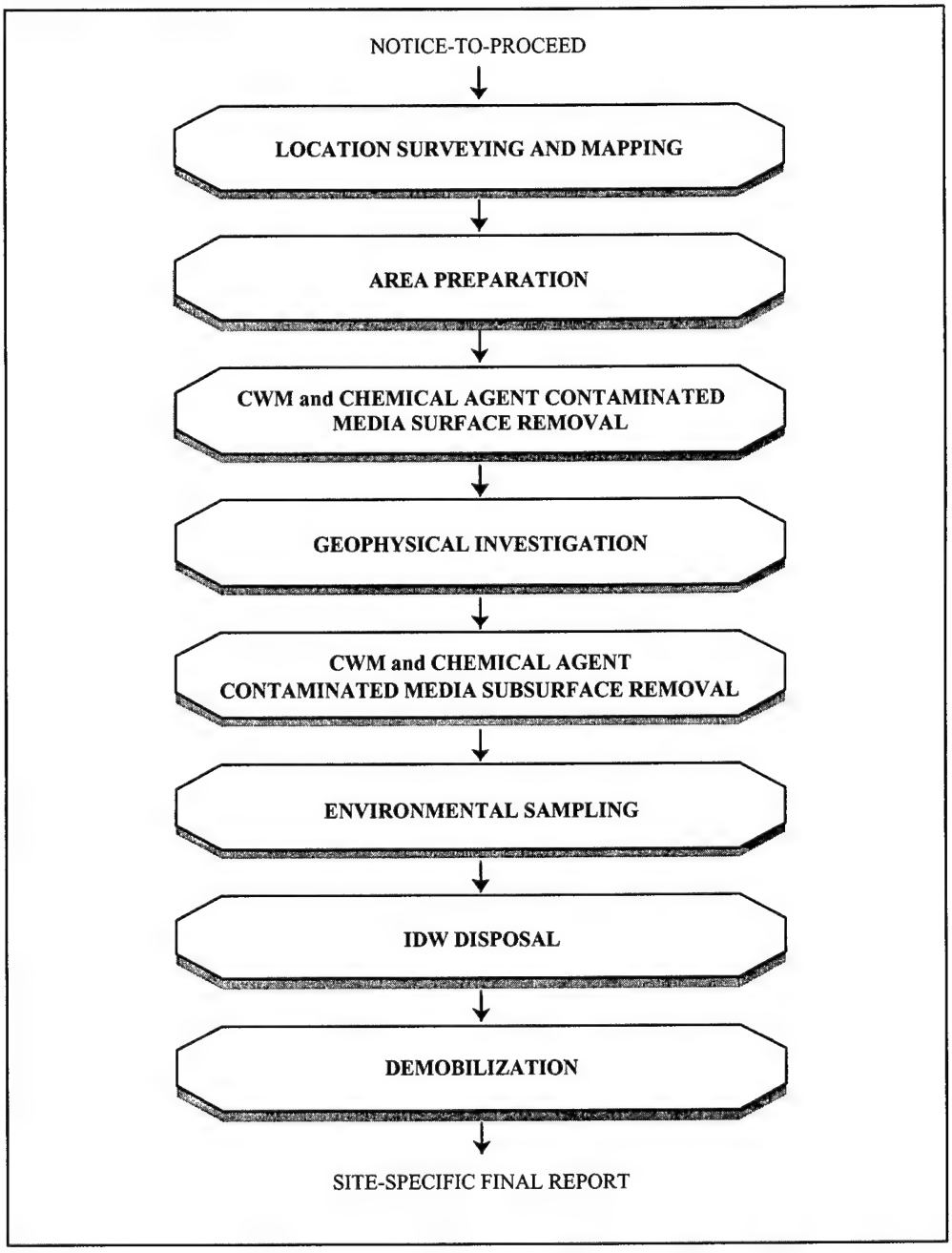


Figure 6-2. Removal Action Process

e. Geophysical Investigation. The purpose of the geophysical investigation is to acquire geophysical data and identify all anomalies that resemble UXO/OE. Geophysical investigations may be completed using detection equipment with real time or post-processing discrimination techniques. The latter requires the collection and recording of geophysical data that is subsequently processed by commercial software to identify electronic signals representative of anomalies. All anomalies selected for excavation will be mapped, documented on dig-sheets, physically re-established by survey methods, and marked for investigation. Information on the elements, which must be considered when planning and executing a geophysical investigation, is provided in EM 1110-1-4009.

f. RCWM and Chemical Agent Contaminated Media Subsurface Removal.

(1) Intrusive activities are conducted to investigate and identify the source of each subsurface anomaly. Anomalies deeper than 12 inches may be excavated using mechanical or manual methods. Only approved UXO personnel will perform excavations. All excavations will be performed in accordance with the provisions of 29 CFR 1926, subpart P.

(2) After the probable source of the subsurface anomaly is removed, the excavation will be rechecked with a magnetometer or other ordnance detector prior to backfilling. If the location does not produce another anomaly upon the recheck, then the excavated area will be backfilled and restored in accordance with contract requirements. If a suspect RCWM item is uncovered, TEU will assess the item, package and transport the RCWM item in accordance with the approved Safety Submission. The contractor will assist TEU as needed. In addition, the contractor will perform environmental sampling in accordance with Chapter 9 of this document to verify that no residual chemical agent contamination remains after the removal of all suspect RCWM items. Also, when possible, the contractor will remove all chemical agent contaminated media and store for later disposition.

(3) Evacuations. Evacuations are sometimes necessary when conducting intrusive investigations in order to minimize the risk of the operation. The NOSE distance based on the MCE is calculated to ensure that the public are outside of that distance during the conduct of the excavation. Implementing engineering controls can reduce the NOSE distance. The use of engineering controls is discussed in Chapter 5 of this document.

(4) Other considerations. There are several other considerations, which must be accounted for during the intrusive investigation, including: air monitoring, exclusion zone management, and quality assurance. These topics are discussed in detail in later chapters of this document.

(5) Conventional fragmentation distance. When determining which fragment range to use, the following guidelines should be followed. If the identification of the OE expected at the site is unknown, the default distances listed in Chapter 4, paragraph C5.5.4, DOD 6055.9-STD will be used. If it is not practical to use these default distances and the identification of the OE expected at the site is known,

then the maximum fragment throw range calculated in accordance with HNC-ED-CS-S-98-1, Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives, will be used. The item with the maximum fragment distance will become the MPM for the site. For unintentional detonations, the project team may request approval from the USAESCH OE Safety Branch to use the range to no more than one hazardous fragment per 600 square feet (1/600 distance) calculated in accordance with HNC-ED-CS-S-98-2, Methods for Calculating Range to No More than One Hazardous Fragment per 600 Square Feet, in lieu of the maximum fragment throw range. The maximum fragment distances and the 1/600 distances will be calculated by the USAESCH Structural Branch and provided to the PM.

(6) The public evacuation distance is the greater of the NOSE or the conventional fragmentation distance, taking into consideration reduction of either of these distances due to the use of engineering controls.

g. IDW Disposal. IDW will be characterized and disposed of in accordance with Chapter 10.

h. Demobilization.

(1) Demobilization may occur for a variety of reasons, including:

(a) The project may be completed with all work accomplished.

(b) The project may be incomplete, but the contractor has expended most of the contract funds.

(c) Adverse weather conditions.

(d) Determination that continuing in the present course of action is not in the best interest of the government.

(2) A demobilization plan will be developed by the contractor in close coordination with the PMNSCM, TEU, PM, USAESCH OE Design Center, OE Safety Specialists, and the customer. Authorization to demobilize from a site must be issued in writing to the contractor from the CO. The following areas should be addressed in the demobilization plan:

(a) Arrangements for periodic maintenance and monitoring for the IHF.

(b) Arrangements for closing out the IHF and shipping back to PMNS.

(c) Disposal of RCWM scrap (if necessary).

(d) Disposal of conventional scrap (if necessary).

(e) Storage and transport of 3X contaminated equipment (if necessary).

(f) Disposal or transfer of remaining explosives (if necessary).

(g) Disposition of commercial explosive storage containers (if necessary).

(h) Close down of Command Post facilities.

(i) Disposition of GFE (if necessary).

(j) Disposition of portable sanitary facilities (if necessary).

(k) Shutting down of public utilities at the project site (i.e., water, electrical).

i. Site Specific Final Report. At the completion or termination of a RCWM removal action, the contractor will prepare and submit a Site Specific Final Report. The Site Specific Final Report documents all activities and operations that occurred and lists the RCWM found during the removal action. This report is used as the basis for USACE's recommendations for future land use and for any proposed restrictions on the cleared area. EP 1110-1-18 discusses the required content and submittal procedures for the Site Specific Final Report.

6-4. Project Completion. The project completion requirements for a RCWM removal action are discussed in EP 1110-1-18. Since the USAESCH OE Design Center executes the RCWM response action, the requirements for completion of an OE removal action executed at a FUDS by an OE Design Center, as discussed in EP 1110-1-18, are applicable to RCWM projects.

6-5. Operations and Maintenance (O&M). The purpose of O&M activities is to ensure that appropriate site safety and security measures remain in place and to maintain the integrity of any site controls, such as fences and signs. The determination of appropriate safety and security measures site controls must be made on a case-by-case basis. The district is responsible for ensuring that appropriate O&M activities are in place. Additional information on O&M related issues, such as recurring reviews, recordkeeping and access restrictions are discussed in EP 1110-1-18.

# CHAPTER 7
# SAFETY SUBMISSION

7-1. Introduction.

a. The Safety Submission provides the specifications for conducting work activities at a RCWM project site. It details the scope of the project, the planned work activities, the potential site hazards and the methods of controlling the hazards. A Safety Submission is required when removal activities (e.g., surface removal of RCWM or excavations when the intent is to uncover, characterize, and remove geophysical anomalies that have the potential to be RCWM items) will be performed.

b. The USAESCH OE Design Center, is the only USACE office authorized to perform this work. The PM, in coordination with the USAESCH OE Design Center will prepare the Safety Submission and it will be approved by the Army Safety Office.

7-2. Contents. The Safety Submission is a detailed description of the work to be performed on the project site. Additional required plans are: Work Plan, Site Safety and Health Plan, and Supporting Plans. These three components are discussed below. A detailed outline of the contents of the Safety Submission may be found on the OE MCX website at http:www.hnd.usace.army.mil/oew/policy/dids/didindx.html as DID OE-060.

a. Work Plan.

(1) A site-specific Work Plan is required for all RCWM projects. Following the site visit, the Work Plan will be prepared to describe the methodology for accomplishing the RCWM response action.

(2) The Work Plan will be prepared in accordance with contract requirements. Generally, the Work Plan will discuss the topic areas provided below. If a topic area is not required for a particular project, the chapter will be included in the Work Plan with a declaration that the information was not required for the project. A detailed outline for the Work Plan may be found on the OE-MCX website at http://www.hnd.usace.army.mil/oew.

(a) Executive Summary.

(b) Project Overview.

(c) Intrusive Excavation.

(d) Contingency Plan.

(e) Intact Containers Monitoring and Disposal.

(f) Scrap Monitoring and Disposal.

(g) Soil Monitoring and Disposal.

(h) Investigative Waste Monitoring and Disposal.

(i) Chemical Data, Laboratory and Field Work Sampling.

(j) Quality Control.

(k) Site Specific Environmental Protection.

(3) A sample detailed outline for the RCWM Work Plan is included in the Safety Submission Outline. The outline presents the subcomponents required for each of the topic areas listed above.

b. Site Safety and Health Plan.

(1) Prior to performing on-site work, a SSHP in accordance with the requirements of 29 CFR 1910.120(b)(4), 29 CFR 1926.65(b)(4), ER 385-1-92, and the requirements to be published in ER 385-1-95.

(2) The SSHP will be prepared in accordance with contract requirements. The SSHP will discuss the topic areas provided below.

(a) Introduction. A reference to the Work Plan is sufficient to direct readers to detailed information on the site description; project scope and objectives; and staff organization, qualifications and responsibilities.

(b) Public Safety Protocols.

(c) Activity Hazard Analysis per task.

(d) Identification and Analysis of Physical Hazards.

(e) Accident Prevention and Reporting.

(f) Training.

(g) Personal Protective Equipment Plan.

(h) Medical Surveillance and Medical Support.

(i) Environmental and Personnel Monitoring.

(j) Personnel and Equipment Decontamination.

(k) Emergency Response and Contingency Plan.

(l) Engineering Controls and Safe Work Practices.

(m) Logs, Reporting and Record Keeping.

(3) A sample detailed outline for the RCWM SSHP is located on the OE MCX website at http:www.hnd.usace.army.mil/oew/policy/dids/didindx.html under DID OE-05-006. This outline presents the subcomponents required for each of the topic areas listed above. Chapter 8 of this pamphlet provides more detailed information on the safety considerations for RCWM response actions.

c. Supporting Plans. This section discusses the supporting plans required in the Safety Submission. These plans, which are prepared by government agencies, include: TEU Assessment Plan; ECBC Air Monitoring and Analysis Plan; Public Evacuation or Shelter-in-Place Plan; and PMNSCM Plans. At the time a SOW is provided to the contractors, a SOW is issued to TEU, ECBC and PMNSCM to initiate the preparation of the supporting plans.

(1) TEU Assessment Plan.

(a) This plan is prepared by the TEU and includes their standing operating procedures (SOPs), Operational Orders, and specific equipment operations manuals that will be used to support the cleanup efforts.

(b) TEU's responsibilities generally include the following tasks:

- Coordinate and provide input to the Work Plan and SSHP.
- Calculate the downwind hazard areas using the D2PC downwind hazard dispersion modeling tool.
- Aid contractor in the excavation activities within the exclusion zone when non-OE items are being excavated.
- Assess suspect RCWM.
- Package suspect RCWM.
- Transport suspect RCWM.

(c) SOPs for Specific Items. The following SOPS, as applicable, must be located on-site:

- EOD Response to Ordnance Items.
- Use of the PINS.
- Use of the Raman spectrometer.
- Packaging.
- X-Ray Procedures.
- Assessment/re-assessment.

(2) ECBC Air Monitoring and Analysis Plan.

(a) Air monitoring methodologies for chemical agent.

- Near real time.
- Depot Area Air Monitoring System (DAAMS) tubes.
- Head space.
- Fenceline Open-Path Fourier Transform Infrared Spectrometry (OP-FTIR)

(b) Environmental analysis for chemical agents and degradation products.

- Soils.
- Liquid waste.

(3) Public Evacuation or Shelter-in-Place Plan. The USACE district, in close coordination with the USAESCH OE Design Center, will be responsible for these plans, as necessary. These plans will discuss the logistics of evacuation and alarm procedures, as required.

(4) PMNSCM Plans. The PMNSCM Plans are composed of the following sub-plans:

(a) Interim Holding Facility (IHF) Plan. The IHF Plan will address all matters concerning the temporary storage of recovered RCWM. This includes the physical location, design, physical security, equipment requirements, personnel training requirements, monitoring requirements, descriptions of all necessary activities required during operation, and surveillance requirements.

(b) Transportation Plan. The Transportation Plan will address all transportation matters concerning the movement of the RCWM item(s) from the exclusion zone to the IHF and from the IHF to the final destination point.

(c) Disposal Plan. The Disposal Plan will be provided by PMNSCM for the Safety Submission.

7-3. Review and Approval. Coordination, review and approval of RCWM Safety Submissions and corrections or amendments to RCWM Safety Submissions will be submitted in accordance with DACS-SF Memorandum, "Approval of Safety Submissions for Non-Stockpile Chemical Warfare Materiel (RCWM) Response Activities," 29 Feb 2000.

7-4. Amendments. Amendments to RCWM Safety Submissions should be signed by the same signatories (offices or agencies) as the original Safety Submission.

# CHAPTER 8
# SAFETY AND HEALTH CONSIDERATIONS

8-1. Introduction.

a. This chapter discusses the safety and health considerations for planning and executing a RCWM response project.

b. Safety is the primary consideration in all RCWM response actions. Detailed safety and health practices and procedures must be developed and implemented at each site to provide proper control of and protection against the unique safety hazards associated with specific on-site activities. All RCWM response activities will be planned and conducted in accordance with the requirements of this section, will be thoroughly coordinated with the OE MCX, and will include participation of explosives safety technical personnel.

8-2. Policy. All USACE and contractor elements will conduct RCWM response projects in compliance with regulations and guidance publications referenced below. Additionally, safety and occupational health documentation will comply with other applicable federal, state, and local safety and occupational health requirements.

8-3. Personal Safety Considerations. The most important consideration throughout all aspects of RCWM response activities performed by USACE and its contractors is the safety and health of the public and on-site personnel.

a. Safety of Government Personnel. All government personnel assigned as OE Safety Specialists will meet the prerequisites identified in EP 1110-1-18.

b. Safety of Contractor Personnel. All contractor personnel will be trained and experienced in their assigned positions in accordance with the guidance provided in paragraph 8-5 of this chapter. The contractor will ensure that their work force complies with OSHA requirements and will assign a Site Safety and Health Officer for each project. The Site Safety and Health Officer will be corporately responsible for the health and safety environment of the contractor's work force. The OE safety specialist will provide safety oversight to ensure the contractor's compliance with established policies and procedures. The contractor will be required to prepare a SSHP and present site-specific training to the work force prior to work beginning; attendance at the training will be documented.

8-4. Work Standards and Personnel Qualifications. The OE MCX has set forth Work Standards and Personnel Qualifications for UXO contractors working on UXO contracts for the USACE. The standards are the minimum only and may be expanded at any time; however, they will not be relaxed

without the approval of the OE MCX/Safety Manager. These standards are is available on the OE MCX website at http://www.hnd.usace.army.mil/oew. These standards are also provided in EP 1110-1-18.

8-5. Training.

a. Personnel. All workers associated with a non-stockpile RCWM site will be trained commensurate to the site hazards and the associated tasks. This training will meet the requirements of 29 CFR 1910.120(e), and to be published in ER 385-1-95. They will receive updated training on an annual basis. The training requirements listed below are chemical agent specific requirements, required by Army regulation.

(1) Site Workers. Site workers will be trained in accordance with all applicable Army regulations. Agent related site-specific training will be conducted by a qualified instructor from either the contractor or TEU. This training will be completed during the site-specific training that is conducted prior to work beginning on-site. In addition, all workers initiating the job will participate in the pre-operational survey and the supervisors initiating the job will participate in the tabletop exercise.

(2) Medical Support Personnel. Because of the uniqueness of chemical agent, all medical support personnel must be trained in chemical casualty care. Presently, this service is provided through a PMCD contractor. The training takes approximately one day and should be coordinated through the USAESCH OE-MCX.

(3) Fire and Police Support. Army regulations require any member of the police and/or fire department who is a member of the initial response force must be trained in self-aid, buddy aid, emergency first aid, individual protection, casualty decontamination and evacuation procedures.

b. Site-Specific Training.

(1) Generally, on non-stockpile sites, the following information is covered during the site-specific training prior to the start of work on site. A qualified instructor (qualified in accordance with 29 CFR 1910-120(e)(5) ) from either the contractor or SBCCOM will provide the training. This training is conducted annually for long term projects. Employees will be trained in the following items at the beginning of each project:

(a) Names of persons and alternates responsible for site safety.

(b) Safety, health, and other hazards known to be on the site.

(c) Use of PPE.

(d) Work practices to minimize hazards.

(e) Safe use of equipment and other controls on site.

(f) Medical surveillance requirement.

(g) Decontamination procedures (if necessary).

(h) An emergency response plan.

(i) Confined space entry procedures (if applicable).

(j) A spill containment program (if applicable).

(2) Additional site-specific training covering site hazards, procedures, and all contents of the approved SSHP will be conducted by the UXO Safety Officer (UXOSO). This training will be provided for all on-site employees, including those assigned only to the Support Zone, prior to the commencement of work; for visitors prior to entering the site; and on a continual basis.

(3) Toxic Chemical Munition Training. Any training necessary to address toxic chemical munitions will be completed during site-specific training.

c. Mandatory Training. The initial training required prior to performing work on a RCWM site may include: 40-hour training; 24-hour training; on-site management and supervisor training; workers outside of controlled area training; noise training; site visitor training; and office and administrative worker training. Additional information on these training requirements is provided in EP 1110-1-18 and the requirements to be published in ER 385-1-95.

d. Refresher Training. All employees requiring 40-hour or 24-hour training, as well as managers and supervisors, will receive eight hours of refresher training annually on the topics specified in paragraph 8-5b, ensuring the requirements of 1910.120(e) and the requirements to be published in ER 385-1-95 are met. All on-site personnel will have current OSHA training certification upon reporting for work. Employees will also critique any incidents that have occurred in the past year that can serve as training examples of related work, and other relevant topics.

e. First Aid and CPR Training.

(1) When a medical facility or physician is not accessible within five minutes to a group of two or more employees for the treatment of injuries, at least two employees on each shift will be qualified to administer first aid and CPR.

(2) Employees designated as responsible for rendering first aid or medical assistance will be:

(a) Included in their employer's blood-borne pathogen program in accordance with 29 CFR 1910.1030.

(b) Instructed in the sources, hazards, and avoidance of blood-borne pathogens.

(c) Provided with, use, and maintain PPE when appropriate for rendering first aid or other medical assistance to prevent contact with blood or other potentially infectious materials.

f. Training Certification. Each employee successfully completing the training and field experience requirements specified above will be certified as having successfully completed the necessary training. A written certificate will be given to each person certified. The certificate or a copy of the certificate will be maintained at the project site as proof of the completion of the training. Any person not certified is prohibited from engaging in on-site OE response operations.

g. Documentation. All health and safety training, including the names of employees trained, the duration of the training, the contents of the training courses, and the dates of training will be documented and appended to the SSHP. Records must be kept to ensure identified personnel receive appropriate initial health and safety training and annual refresher courses. Response action contractors and visitors must provide evidence of health and safety training before site entry is authorized.

8-6. Team Training and Pre-Start Exercises.

a. In order to have a project run smoothly and to ensure that all of the different contractors and agencies involved understand their portion of the project, the proper chain of command for operations and safety and health, and the proper lines of communication, the project team will be tested during two pre-start exercises. These exercises include the table top exercise and the pre-operational survey (Pre-Op). In order to prepare for the table top and the pre-op, all on-site personnel will conduct training together, typically of five (5) days duration. This training will be conducted one week prior to the scheduled table top and pre-op and will be run by the USAESCH OE Safety Specialist. All equipment must be on site during this training. All of the other site-specific training will be completed prior to the start of this training. It is the responsibility of each organization to ensure that when their workers are rotated out during a project that the information gained during these exercises is communicated to the new site personnel.

b. Table Top Exercise.

(1) A table top exercise is required by Army regulation to be completed prior to the start of a chemical agent project. According to the Interim Guidance, the table top exercise will be conducted by

the MACOM with overall responsibility for the activity. USAESCH will conduct the table top exercise as requested by the USACE district. Participants will include all on-site support agencies and any local responders that are supporting the project.

(2) The table top exercise is generally conducted in a "conference room" and usually lasts between two and six hours, depending on the project size and interest. This open discussion will take place in a non-threatening environment. It is an exercise utilizing simulations to conduct drills of emergency response to different RCWM accident and incident scenarios. The purpose of the table top exercise is to ensure the effectiveness of the responses and to identify deficiencies or omissions in the emergency response process. It is also used to establish continuity and coordination among response agencies.

c. Pre-Operational Survey.

(1) A Pre-Operational Survey is required by Army regulation to be completed prior to the start of a chemical agent project. According to the Interim Guidance for BWM and RCWM, the pre-op will be conducted by the Army Safety Office, using a team of chemical agent subject matter experts. Responsibility for the pre-op may be delegated to the MACOM with overall responsibility for the project activity.

(2) The pre-op is conducted on-site and usually lasts between three and four days. It is a survey to ascertain that personnel, equipment and materials required for work activities are on site, that personnel are trained and qualified to perform their work assignments, and that work procedures and safety controls are appropriate for the tasks. The survey is based on the approved Safety Submission, personnel interviews, records review, equipment inventories and the performance of site personnel during simulated work scenarios. Appendix B includes an example of the Pre-Operational Survey Checklist.

8-7. Personal Protective Equipment (PPE).

a. On non-stockpile RCWM sites there is a potential to encounter both industrial chemicals and chemical agents. Because of the high probability of encountering industrial chemicals on these sites, the use of National Institute for Occupational Safety and Health (NIOSH)-certified commercial, full-facepiece respirator (commercial respirator) and commercially available protective clothing is recommended for USACE contractors.

b. Respiratory Protection.

(1) In 1996 the DACS-SF developed and issued a policy to allow for the use of commercial respirators for projects where the potential for both industrial and chemical agents exist. This policy is

contained in a memorandum dated 30 Dec 1998, titled "Revised Policy for the Use of NIOSH-Certified Commercial Respirator with Chemical Agents." A copy of this memorandum is contained in Appendix C.

(2) The intent of this policy is to provide more options to address the wide mix of chemical hazards on and off military installations. The respirators are intended to be worn in areas where exposure to vapor or liquid agent is possible but not expected. ECBC maintains the file of respirator test results. Before testing, the user should contact ECBC to determine what testing has been done or if the product has complete test results.

(3) Approval Process. Each requestor is required to forward all test data and the "use scenario" to HQDA Office of the Deputy Assistant for Army Safety (ODASAF) through the USAESCH OE Design Center. The HQDA ODASAF will forward the request to the CASHPAC that has a working group that reviews the submitted information. It is important to allow six to eight weeks, at a minimum, for CASHPAC to review and comment on the submittal.

c. Chemical Protective Clothing (CPC).

(1) In 1994, the Army Safety Office developed a program to allow the use of commercially available chemical protective clothing (Level A) during toxic chemical operations. In January 1998, DA Safety extended this program to include commercially available Level B suits. A copy of these test matrices is located in Appendix D.

(2) Before a USACE contractor can use these suits on a RCWM site, the test data along with the use scenarios as described in the written procedures must be submitted to DA Safety through USAESCH.

(3) Approval Process. Each requestor is required to forward all test data and the "use scenario" to HQDA ODASAF, through USAESACH OE Design Center. The HQDA ODASAF will forward the request to the CASHPAC which has a working group that reviews the submitted information. It is important to allow six to eight weeks, at a minimum, for CASHPAC to review and comment on the submittal.

8-8. Medical Support and Surveillance.

a. Medical Support.

(1) Army regulations require on-site medical support and a Memorandum of Agreement (MOA) with a local hospital during any routine or emergency operation which could result in the exposure of

personnel to chemical agent. For medical planning purposes, the number and types of casualties anticipated should be determined by the most probable event.

(2) The degree of medical support for each site will be determined in consultation with the SBCCOM Occupational Medicine Officer. Coordination with the medical support providers is the responsibility of the USACE district. If the district is not able to provide this support the district commander must send a letter to USAESCH to request this support. Information as to the details of the medical support will be addressed in this section of the SSHP.

(3) Requirements.

(a) On-Site Support. In general, as a minimum, a State or National Registry of Emergency Medical Technician-certified paramedic, with special training in chemical warfare agent casualty care, will be available at each site during site characterization, excavation, transportation and/or disposal operations, along with a vehicle designated for use in patient transport. A MOA or a contract which contains all of the wording contained in the MOA will be developed and signed by both the medical provider and the USACE district commander prior to the start of intrusive work on site.

(b) Medical Treatment Facility. A MOA will be developed with a medical treatment facility that is capable of handling site injuries.

(4) Training. Army regulation requires that the medical Support Personnel be trained in the Management of Chemical Warfare Agent Chemical Casualty Care. Presently, this training is conducted through a contract that the PMCD has in place. The USACE district will coordinate this training through the USAESCH Safety Office. It is recommended that this training be scheduled as far in advance of the project as possible.

(5) Memorandum of Agreement. A MOA (or Contract) will be developed with each medical treatment facility and ambulance/paramedics provider to ensure that the appropriate outside resources will be available in the event of a chemical accident or incident. The MOA should describe in detail the types of chemical materiel to which workers might be exposed, the type of training to be provided to the health care providers, the agency responsible for providing this training and the frequency of the refresher training. The MOA should also specify how casualties will be transported to local hospitals, by whom and any contingency plans for casualty evacuation. If propositioned antidotes are required for effective treatment, provisions for this should be addressed.

b. Medical Surveillance.

(1) The contractor and the government PM will ensure that all persons entering a RCWM exclusion zone meet the following requirements. If the contractor or government agencies believe that

the requirement does not apply to a specific task or site, a negative declaration will be included in the SSHP.

(2) Medical examination required by DA Pam 40-173, Category B, as a minimum, if the potential for mustard exists. (See http://www.usapa.army.mil/pdffiles/p40_173.pdf).

(3) Medical examination required by DA Pam 40-8 (see special provisions for contractor personnel, DA Pam 40-8, Chapter 4, Paragraph 4-8b), if the potential for nerve agent exposure exists. (See http://www.usapa.army.mil/pdffiles/p40_8pdf).

(4) Requirements in AR 40-5, Preventive Medicine, Chapter 5, paragraph 5-10 and DA Pams 40-8 and 40-173, Chapter 4, paragraph 407 and Appendix D, for the treatment of occupational illnesses and injuries.

(5) Requirements of AR 40-5, Chapter 5, paragraph 5-20 for reproductive hazard surveillance.

(6) Medical evaluation of workers in accordance with 29 CFR 1910.120 and/ or 1910.134, as applicable. Contractors will maintain on-site a file containing all on-site personnel's certificate of current (within 365 days) medical evaluation.

8-9. Heat and Cold Stress Monitoring. Heat and cold stress monitoring protocols, as appropriate, will be described in detail. Work/rest schedules will be determined based upon ambient temperature, humidity, wind speed (wind chill), solar radiation intensity, duration and intensity of work and protective equipment ensembles. Minimum required physiological monitoring protocols which will affect work schedules will be developed. In cases where impervious clothing is worn, the NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" protocol for prevention of heat stress will be followed and heat stress monitoring will commence at temperatures of 70° Fahrenheit. Where impervious clothing is not worn, the American Conference of Governmental Industrial Hygienists (ACGIH) heat stress standard (threshold limit value - TLV) will be used. For cold stress monitoring to help prevent frostbite and hypothermia, the ACGIH cold stress standard will be referenced and followed, as a minimum.

8-10. Personnel and Equipment Decontamination. The contractor will develop and specify decontamination procedures in accordance with 29 CFR 1910.120, AR 385-61 and DA Pam 385-61 for personnel, PPE, monitoring instruments, sampling equipment, and heavy equipment. Decontamination procedures will address specific measures to ensure that contamination is confined to the work site. Necessary facilities and their locations, detailed standard operating procedures, frequencies, supplies, and materials to accomplish decontamination of site personnel and to determine adequacy of equipment decontamination will be discussed.

8-11. Emergency Response and Contingency Procedures (On-site and Off-site). An Emergency Response Plan as required by 29 CFR 1910.120 and DA Pam 50-6 will be developed and implemented. As a minimum it will address the following elements:

a. Pre-emergency planning and procedures for reporting incidents to appropriate government agencies for potential chemical exposure, personal injuries, fire/explosions, environmental spills and releases, discovery of radioactive materials.

b. Personnel roles, lines of authority, communications.

c. Posted instructions and list of emergency contacts: physician, nearby notified medical facility, fire and police departments, ambulance service, state/local/federal environmental agencies, Certified Industrial Hygienist (CIH), and CO.

d. Emergency recognition and prevention.

e. Site topography, layout and prevailing weather conditions.

f. Criteria and procedures for site evacuation (emergency alerting procedures/employee alarm system, emergency PPE and equipment, safe distance, place of refuge, evacuation routes, site security and control).

g. Specific procedures for decontamination and medical treatment of injured personnel.

h. Route maps to nearest pre-notified medical facility.

i. Criteria for initiating community alert program, contacts and responsibilities.

j. Critique of emergency responses and follow-up.

k. Material Safety Data Sheets (MSDS) for each hazardous substances anticipated to be encountered on site will be made accessible to site personnel at all times

8-12 Standing Operating Procedures, Engineering Controls and Work Practices.

a. Work Week. OE personnel involved in performing OE field operations will be limited to a 40-hour week, either four-10 hour days or five-eight hour days, unless a waiver is approved by the USAESCH Safety Manager. Two consecutive work weeks will be separated by 48 hours of rest.

b. OE Team Composition and Roles.

(1) A full time UXOSO will be present during all field operations on a RCWM project site due to the complex hazards posed by RCWM.

(2) A Quality Control Specialist (QCS) will be used for all RCWM field operations.

8-13. Logs, Reports, Record Keeping, Accident Reporting.

a. Accident Reporting.

(1) All accidents will be reported and investigated to determine the cause of the accident and develop controls to prevent recurrence. Notification and reporting will be in accordance with AR 385-40, Accident Reporting and Records; USACE Suppl 1 to AR 385-40; and EM 385-1-1, Safety and Health Requirements Manual.

(2) The contractor's UXOSO is responsible for accident reporting. For contracts under the supervision of the district, accidents will be reported to the district safety office with an informational copy to be forwarded to the OE MCX. USACE district personnel will report through the OE MCX and Command channels to CESO.

# CHAPTER 9
# ENVIRONMENTAL SAMPLING AND ANALYSIS

9-1. Introduction.

a. This chapter discusses the purpose, applicability and procedures for environmental sampling and analysis.

b. Purpose. When a RCWM release occurs, whether by detonation, spillage, leakage, or disposal, any media (e.g., air, soil, water), which has potentially been contaminated with chemical agent, may pose a threat to human health or the environment. The purpose of analyzing and/or monitoring representative samples of this media is to discern the presence/absence of chemical agent. This data is used to evaluate whether pre- or post-site actions are protective of human health and the environment.

c. Applicability. Environmental sampling and analysis may be performed as part of the EE/CA to characterize the site. Environmental sampling and analysis must be performed during removal actions to confirm that chemical agent contaminated media has been removed.

9-2. Contaminants of Concern (COC). During the initial phases of site characterization, COCs are determined from historical information. The actual COCs may change during the site characterization process based on additional findings. Changes in the site-specific COCs as identified in the Safety Submission and/or SSHP may require modifications to these documents if changes to the site operation procedures are required. Some types of chemical agents are not persistent in certain types of environments or after certain periods of time. The persistence of a chemical agent and its environment should be taken into consideration when determining COCs for a specific site. A list of the most common chemical agents, their breakdown products and their persistency in different environments may be found on the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) website at http://chppm-www.apgea.army.mil/dts/dtchemfs.htm.

9-3. Edgewood Chemical Biological Center (ECBC). ECBC is the government agency responsible for the development of analytical procedures and SOPs pertaining to chemical operations. On USAESCH RCWM projects, ECBC is responsible for development of the Air Monitoring Plan; conducting all monitoring for chemical agent in accordance with ECBC's Monitoring Branch Quality Control Plan; maintaining control over all RCWM monitoring data generated during the project; training and certifying personnel on operation of MINICAMS; providing and calibrating equipment for personal monitoring; calibrating, challenging, and operating MINICAMS for real time analysis support; setting up monitoring stations and collecting historical monitoring samples in support of real time monitoring; conducting on site analysis for headspace samples collected from media suspected of being contaminated with chemical agent; and maintaining all sampling records in accordance with AR 40-5

and 29 CFR 1910.120. Other responsibilities that ECBC may be required to perform during site operations are on-site analysis of environmental samples using the Mobile Environmental Analytical Platform (MEAP) or headspace monitoring environmental samples before shipping by a commercial carrier to an off-site Chemical Surety Laboratory for analysis.

9-4. Air Monitoring.

a. General. Air monitoring for chemical agent is required whenever there is a risk for worker or public exposure to chemical agent during or due to site operations. An air monitoring plan must be developed to establish the policies, objectives, procedures and responsibilities for the execution of a site specific monitoring program.

b. Purpose of Air Monitoring. The intent of air monitoring is to indicate to workers when a hazardous atmosphere is present and to maintain a record of employee exposure to airborne chemical agent, thus ensuring the safety of the operators, the environment and the public. The choice of monitoring equipment is based on the type of monitoring to be performed and the types of agent involved. The location of monitors or sample ports is based on the operation, the airflow in the area, and the location of the source of agents.

c. Monitoring Plan. DA Pam 385-61 requires that a monitoring plan be developed in writing and implemented. Generally, the air monitoring section within the SSHP and ECBC's plan satisfy this requirement. The policy requires that the plan contain the following information:

(1) A diagram of the operation.

(2) Agent(s) involved.

(3) Monitors to be used.

(4) Placement of sampling points based on characteristics of agent, airflow and monitoring equipment being used.

(5) The kind of sampling lines used, to include the length, material made from and if the sampling lines are heat traced.

(6) Provisions for low level personnel monitoring during operations.

(7) Identification of work stations where agent leakage is considered possible.

d. Monitoring Equipment. The following low level, near real time monitoring equipment is used on an agent-contaminated media site for air monitoring for agent.

(1) Miniature Continuous Air Monitor System (MINICAMS). MINICAMS is an automatic air monitoring system that collects compounds on a solid sorbent trap, thermally desorbs them into a capillary gas-chromatography column for separation and detects the compounds with a flame-photometric detector. It is a lightweight, portable, near real time, low-level monitor with alarm capability, designed to respond to GB, VX, mustard and Lewisite. However, the lewisite MINICAMS has not been approved by DA for use as a quantitative monitor. To use the lewisite MINICAMS in this capacity an exemption must be submitted for the installation or district commander's approval.

(2) Real Time Analytical Platform (RTAP). The RTAP provides an automatic, continuous, environmental monitoring system that collects compounds on a solid sorbent trap, and thermally desorbs them into a capillary gas chromatography column. The gas chromatography (GC) detects eluting compounds with a halogen specific detector (XDS), simultaneous phosphorous and sulfur, dual headed flame photometric detector (FPD), or an electron capture detector (ECD). The RTAP is a self-contained mobile platform that can be moved from site to site. It is a mobile, low level monitor designed to respond to agent present with alarm capability.

(3) Fenceline Open-path Fourier Transform Infrared Spectrometry Air Monitoring (OP-FTIR). Open-path air monitoring of gaseous compounds is a direct extension of laboratory spectroscopy systems that identify and quantify gases based on their spectral absorption characteristics. Typically, open-path systems send a beam of light through the open air, to a reflector and then back to a receiver. If gases that absorb light are present in the beam, they can be identified and quantified. This technology will not sample down to AEL for most RCWM agents.

(4) Depot Area Air Monitoring System (DAAMS). DAAMS is a portable air sampling unit that is designed to draw a controlled volume of air through a glass tube filled with a collection material (Tenax GC). As the air is passed though the solid sorbent tube, agent is collected on a sorbent bed. After sampling for the predetermined period of time and flow rate, the tube is removed from the vacuum line. The tube is transferred to the RTAP or Mobile Environmental Analytical Platform (MEAP) where it is analyzed (approximately 1 hour process time) or sent to the ECBC Monitoring Branch laboratory. The purpose of the analysis is to determine the presence, type and quantity of agent collected in the sampling tubes. This technique will sample down to the AEL for agent.

(5) Mobile Environmental Analytical Platform (MEAP). The MEAP is a self-contained mobile platform that can be moved to a project. It contains all the equipment necessary to analyze and confirm samples taken with DAAMS tubes and extracts of soil and surface water samples. It is designed as a fully functional trailer laboratory to cover the critical on-site chemical analysis and monitoring needs.

(6) Chemical Agent Monitor (CAM). The CAM is a lightweight, hand-held gross level vapor detector designed to respond to nerve and mustard agent vapors. It detects vapors of chemical agents by sensing molecular ions of specific mobilities and uses timing and microprocessor techniques to reject

interferences. When the CAM detects the presence of a chemical agent vapor, a visual display will indicate the class of agent and the relative concentration of agent. The CAM does not have an audible alarm. It has a real-time response capability for the detection of GB, VX, and mustard.

(7) Commercially Available Monitoring Equipment. For the industrial chemicals (e.g., phosgene and chloropicrin) there are commercially available instruments that may also be used on-site for air monitoring, as required.

e. Types of Monitoring. This section discusses the types of air monitoring. Table 9.1 presents a summary of these types of air monitoring.

(1) Background Monitoring. This monitoring should be conducted prior to initiation of site operations in order to provide a baseline of reference for subsequent analyses and to determine any interference in the area. DAAMS tubes and/or MINICAMS are generally used for this monitoring of the chemical agents of concern.

(2) Area Monitoring. General area monitoring provides an early warning to personnel that there is a problem and that action must be taken. The monitoring device or sampling port is placed in strategic locations in the work area where there is a potential for encountering agent vapors. The sample locations are determined based on such factors as the agent involved, the airflow patterns in the area, the operations(s) being performed, and the location of the source of the potential release. A MINICAMS, RTAP and/or commercially available monitors are used for this type of monitoring.

Table 9.1
Types of Air Monitoring

| Air Monitoring | Type | Method | Purpose |
|---|---|---|---|
| Background Monitoring | Baseline | DAAMS Tubes<br>MINICAM<br>OP-FTIR<br>RTAP | To provide a baseline of reference for subsequent analyses |
| Area Monitoring | Near-Real Time | MINICAM/ RTAP<br>Commercially Available Monitor | To provide early, rapid warning to personnel of airborne exposure |
| Perimeter Monitoring | Confirmation/ Historical | DAAMS Tubes<br>OP-FTIR | To confirm real time alarms and to provide a historical record of public exposure due to an airborne release |
| Mobile Area Monitoring | Confirmation/ Historical | DAAMS Tubes | To confirm the results of the real time monitors and to document conditions over time |
| Decontamination Monitoring | Near-Real Time<br><br>Real time | MINICAMS/ RTAP<br>CAM | To continuously monitor at the hot line to provide early, rapid warning of airborne exposure |
| Surface Monitoring | NA | DAAMS Tubes | To determine if surface decontamination is required for media such as scrap metal, glass, etc. that is or has a high potential to be contaminated with chemical agent |
| Headspace Monitoring | NA | DAAMS Tubes<br>MINICAMS | To screen environmental samples which may potentially be contaminated with chemical agent |

(3) Perimeter Monitoring. This monitoring will not be used to immediately warn of hazardous conditions, but will be used to document conditions over time and to confirm a hazardous condition that was indicated by the MINICAMS. DAAMS tube sampling stations and/ or the OP-FTIR are located at the perimeter of the work area to record any chemical agent release beyond the exclusion zone.

(4) Mobile Area Monitoring. Mobile area monitoring is a method of sampling airborne levels of contaminants in the work place. It is taken over the entire work day. A sampling train consisting of DAAMS tubes which are connected to a dual-port sampler is utilized. The dual port sampler is attached by Tygon tubing to a personal air pump. The train is calibrated to a specified air flow rate (liters per minute (LPM)).

(5) Decontamination Monitoring. Personal decontamination station monitoring is used to verify that complete decontamination of a worker or piece of equipment has been conducted. Decontamination monitoring may be conducted with a MINICAMS, RTAP or CAM.

(6) Surface Monitoring. Surface monitoring will be done on equipment and waste of any kind that is suspected to be contaminated with chemical agent in accordance with AR and DA Pam 385-61.

(7) Headspace Monitoring. Headspace monitoring will be conducted on environmental samples suspected of being contaminated with chemical agent prior to off-site shipment for analysis. This is to prevent samples contaminated above the AEL from being shipped by commercial carrier. The SOP for headspace monitoring of environmental samples is provided in Appendix E.

9-5. Environmental Sampling. Environmental sampling will be used to determine if residual chemical agent contamination from a release, spill or disposal operation is present in the surrounding environment. Environmental sampling will also be undertaken to determine if other industrial chemicals are mixed with the chemical agent of concern. The sampling of industrial chemicals of concern is necessary for the determination of the appropriateness of worker protection, to address regulatory concerns, and for disposal characterization. Environmental samples may consist of soils and other solids, water, sludge, and vegetation. Samples will be divided into a minimum of two sub-samples prior to monitoring or analysis for chemical agent. A sample will be homogenized prior to division to ensure all sub-samples have the same properties. Prior to off-site shipment, all samples (including all sub-samples) will be screened using either airborne methods to ensure concentrations are below the AEL or soil and water extraction methods to ensure agent concentrations are below detectable levels in accordance with DA Pam 385-61. The screening process is illustrated in Figure 9-1.

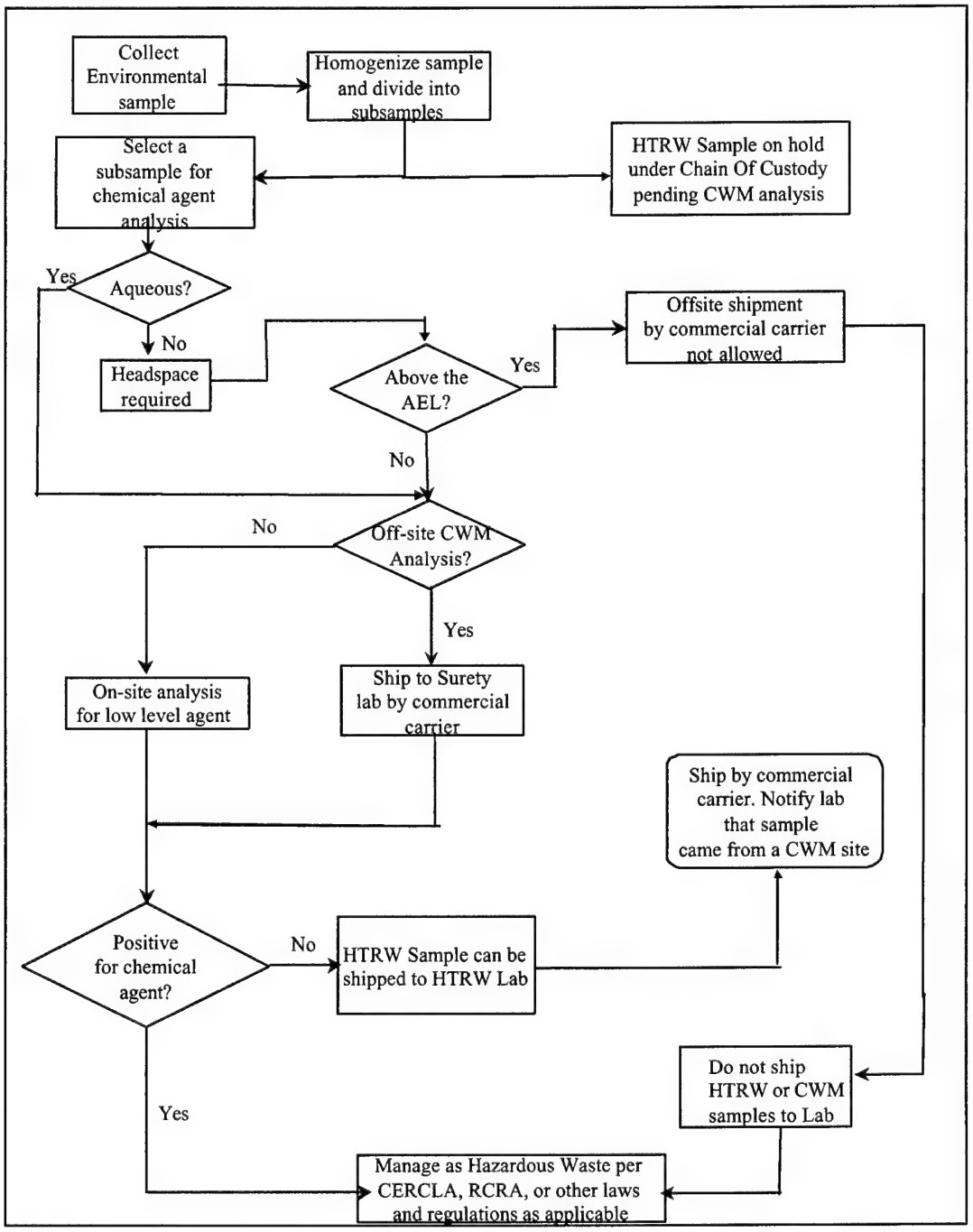


Figure 9-1. Environmental Sampling Characterization

b. Sampling Methodology. Environmental samples will be collected immediately beneath and/or adjacent to any RCWM. Samples of surrounding media should also be collected whenever there are visual or airborne indicators of potential chemical agent contamination. Historical information may also be used to determine sampling locations.

c. HTRW Analysis. If sub-samples of environmental samples are to be analyzed for HTRW contaminants, the following procedures will be followed:

(1) Samples will be homogenized prior to division.

(2) Sub-samples will be retained on-site or at a chemical surety laboratory until split samples have been analyzed by extraction and determined to be free of chemical agent contamination.

(3) Sub-samples will be head-spaced prior to off-site shipment to ensure concentrations are below the AEL.

(4) The receiving laboratory to conduct HTRW analysis is notified in writing that samples could possibly contain chemical agent contamination.

d. Shipment of Environmental Samples. Prior to shipping environmental samples off-site by commercial carrier, all samples must either be head-spaced to ensure chemical agent concentrations are below the AEL or analyzed on-site by extraction to ensure agent concentrations are below detectable levels.

# CHAPTER 10
# INVESTIGATIVE DERIVED WASTE

10-1. Introduction.

a. This chapter discusses the types of investigative derived waste (IDW) encountered on RCWM sites, characterization procedures, and management procedures. Figure 10-1 illustrates the IDW management process.

b. IDW may consist of anything generated during a site investigation or removal action that cannot be reused or recycled. Some media must be managed as IDW until it has been fully characterized. The characterization may determine that the media is suitable for reuse.

10-2. Soil.

a. Soil. Soil may be generated during a project in the form of environmental samples, drill cuttings or excavated soil. Characterization of soil generated during a project is required whenever there is historical, visual or other detectable evidence that contamination may be present. If monitoring indicates an airborne hazard, soil should be containerized to prevent exposure to the contamination. If monitoring does not indicate an airborne hazard, soil may be stockpiled in a way to minimize spread of contamination until characterization has been completed.

b. Characterization. Large volumes of soil are generally characterized by analyzing composite samples. Composite samples for IDW characterization for chemical agent are environmental samples and will undergo the same described in Chapter 9 of this document. The number of composite samples required to characterize a given volume of soil is generally site-specific due to local laws and regulations. When multiple types of contamination are suspected, characterization should be prioritized based on hazard level, beginning with the greatest hazard level. If chemical agent contamination is suspect, soil samples should be analyzed for chemical agent by a chemical surety laboratory prior to any other type of analysis. If a sample analysis is positive for chemical agent, no additional type of analysis will be conducted. Soil contaminated with chemical agent will be classified as hazardous waste and managed in accordance with CERCLA, RCRA, and other environmental laws and regulations as appropriate. Soil with HTRW contamination exceeding the site-specific action levels will also be classified as hazardous waste and managed accordingly. Soil determined to be "clean" will be disposed of on-site.

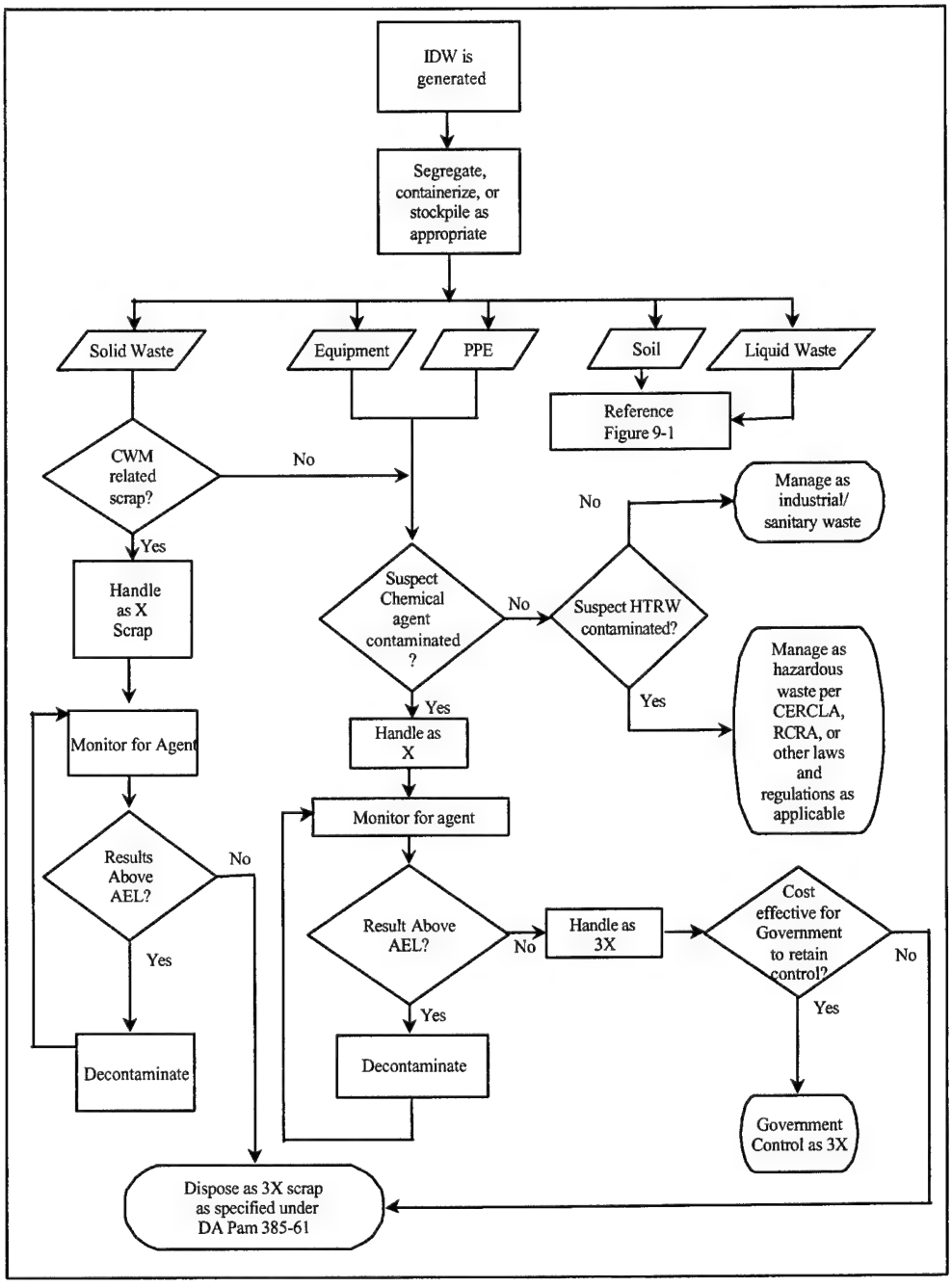


Figure 10-1. IDW Management Process

c. Decontamination and Disposal. Soil contaminated with chemical agent will be decontaminated and disposed of in accordance with DA Pam 385-61. When soil is contaminated with chemical agent and the AEL is exceeded, it will be decontaminated prior to off-site shipment. The preferred method of disposal is by incineration by an approved incinerator. Soil may be disposed with specific approval from the MACOM in an EPA approved landfill or under an authorized state RCRA program for hazardous waste disposal.

10-3. Liquid Waste.

a. Liquid waste may be generated during a project in the form of environmental samples, drilling fluids, and/or decontamination water. Liquid waste will be containerized and managed as IDW until characterization is complete.

b. Characterization. Liquid waste will be characterized by analyzing representative samples of the generated waste for any suspected contamination. Chemical agents generally breakdown in water to less hazardous byproducts. However, if chemical agent is suspect, the environmental sampling procedures described in Chapter 9 of this document will apply.

c. Disposal. Liquid waste which is determined to have contamination levels above the site-specific action levels will be classified as hazardous waste and managed in accordance with CERCLA, RCRA, and other environmental laws and regulations as appropriate.

10-4. Solid Waste.

a. Solid waste or scrap may be generated during a project in the form of recovered debris (e.g., metal, glass, wood) resulting from former site activities. All recovered scrap will be managed as IDW; however, scrap should be segregated and managed based on possible contamination until it has been characterized.

b. Characterization.

(1) OE-related scrap. OE-related scrap must be visually inspected to determine if an explosive hazard is present. If present, the explosive hazard must be mitigated prior to disposal. All OE-related scrap must be certified to be free of an explosive hazard prior to disposal.

(2) Scrap suspected to be contaminated with chemical agent must be monitored to determine if contamination is above the AEL. Scrap that should be considered suspect include materials known to have been used for RCWM operations, materials known to have been exposed to chemical agent, and materials that have been in direct contact with other media determined to be contaminated with chemical agent. If agent contamination is above the AEL, surface decontamination in accordance with DA Pam

385-61 is required. If agent contamination is below the AEL or when an item has been decontaminated to below the AEL, the scrap must be classified as 3X material.

(3) Scrap that has other indications that it may be contaminated with HTRW (e.g., biological waste, visual contamination, air monitoring indicators) will be managed as a hazardous waste.

c. Disposal. Scrap contaminated or suspected to be contaminated with chemical agent or HTRW will be classified as hazardous waste and managed in accordance with CERCLA, RCRA, and other environmental laws and regulations as appropriate. All 3X material will be disposed of in accordance with DA Pam 385-61. Scrap that is determined to be free of contamination may be disposed of in a sanitary or industrial landfill. Whenever possible, scrap that is uncontaminated will be recycled.

10-5. Personal Protective Equipment (PPE).

a. PPE is a generated waste when it is consumable, requiring disposal after its use is finished or when it becomes contaminated with chemical agent or HTRW and decontamination of the PPE is not possible or cost effective. When it is cost effective to do so, chemical agent contaminated PPE can be decontaminated to 3X levels and reused. There are exceptions to this reuse however, property that is determined to be 3X must remain under the control of the Federal Government in accordance with DA Pam 385-61.

b. Decontamination and Disposal. PPE that is contaminated with chemical agent must be monitored to determine if contamination is above the AEL. If agent contamination is above the AEL, surface decontamination in accordance with DA Pam 385-61 is required. PPE contaminated or suspected to be contaminated with chemical agent or HTRW will be classified as hazardous waste and managed in accordance with CERCLA, RCRA, and other environmental laws and regulations as appropriate. All 3X material will be disposed of or managed in accordance with DA Pam 385-61. PPE that has not been in contact with agent liquid or vapor may be disposed of in a sanitary or industrial landfill.

10-6. Equipment Disposition.

a. Equipment is classified as either consumable or durable goods. Some examples of consumable goods are PPE and sampling equipment. Heavy equipment is an example of durable goods that is utilized on RCWM sites.

b. Equipment contaminated with agent requires disposition after its intended use is completed either through disposal or reuse. When cost effective to do so, chemical agent contaminated equipment can be decontaminated to the 3X levels and reused. However, equipment classified as 3X must remain under the control of the Federal Government in accordance with DA Pam 385-61.

# CHAPTER 11
# INTERIM HOLDING FACILITY

11-1. Introduction. This chapter presents an overview of the regulatory requirements, organizational responsibilities, and general requirements for the IHF. The IHF is constructed for the receipt, temporary storage and removal of RCWM from the site. The PMNSCM is responsible for preparing an IHF Plan to provide information about the temporary storage of RCWM in a safe, secure and environmentally sound manner.

11-2. IHF Regulatory Requirements. IHF operations will be in compliance with DA and other regulatory guidelines. Some of the major regulatory requirements for IHF operations include:

a. An EPA identification number will be obtained by the USACE district as the generator of RCWM per 40 CFR 264.11.

b. RCWM hazardous waste must be characterized according to 40 CFR 264.12, then labeled in accordance with 40 CFR 262.34. An operating record must be maintained in accordance with 40 CFR 264.73-264.76 and applicable local regulatory requirements.

c. Appropriate signs must be posted restricting access to the facility per 40 CFR 264.14. Agent and supplemental signs will be posted in accordance with DA Pam 385-61.

d. IHF inspection procedures must be in accordance with 40 CFR 254.15 and available on-site for inspection per 40 CFR 264.74.

e. All personnel involved in hazardous waste management must be HAZWOPER trained in accordance with 29 CFR 1910 to ensure they can implement emergency procedures and activate the facility contingency plan as required by 40 CFR 264.50-264.56.

f. The IHF must be equipped with a secondary containment system per 40 CFR 264.75 and all wastes must be stored separately in containers that are compatible with the waste they contain per 40 CFR 264.172.

g. Storage of recovered RCWM will be in accordance with AR 385-61, DA Pam 385-61, AR 385-64, DA Pam 385-64, AR 50-6, and AR 190-11.

11-3. Organizational Responsibilities. The primary organizations participating in IHF activities on FUDS include the executing district, PMCD/PMNSCM, SBCCOM, and USAESCH.

a. The USACE District. The district executing the RCWM response project has the following responsibilities for IHF operations:

(1) Exercise site control per the IHF Plan and Work Plan during all phases of RCWM recovery operations.

(2) In close coordination with PMCD, select the IHF location and exercise control of RCWM after receipt from the recovery site until the RCWM is removed from the IHF and shipped off-site for treatment.

(3) The district may delegate signature authority for the manifest in accordance with EP 200-1-2, Process and Procedures for RCRA Manifesting. The physical custody of the RCWM will be immediately transferred to the TEU. As generator of the waste, the district will retain accountability until the waste is transported off-site.

(4) Coordinate standby decontamination, medical support, and emergency response during all phases of recovery, on-site transport, and storage.

(5) Oversee site operations conducted by TEU to manage RCWM safely.

(6) Support routine maintenance of the IHF.

(7) Inspect IHF operations to ensure compliance with directives.

(8) Provide physical security support for site operations.

(9) Conduct public involvement in coordination with PMCD.

(10) Coordinate with PMNSCM if failure of the IHF structure or major components occur. Should repair be impractical, coordinate with PMNSCM to replace the IHF and ensure that RCWM is transferred following procedures developed for receipt and storage of RCWM.

(11) Provide communications equipment to key organizations and emergency services.

b. PMCD/PMNSCM. The responsibilities of the PMCD/PMNSCM for IHF operation include:

(1) Provide safe and environmentally acceptable transportation and disposal of RCWM.

(2) Perform a Hazard Analysis that addresses the relative risk associated with the IHF Plan.

(3) Provide a portable IHF for use at the site, if required.

c. SBCCOM. The TEU is a specialized unit of the SBCCOM that may be tasked with the following IHF responsibilities:

(1) Support the district, PMCD, and USAESCH.

(2) Recover suspect RCWM items at the site.

(3) When directed by USAESCH, represent SBCCOM, assume physical custody of RCWM when recovered, perform assessment to determine fill contents, and package the RCWM in overpack containers.

(4) Escort RCWM during on-site transportation and operation of the IHF.

(5) Provide direct support to USAESCH/PMCD to perform monitoring. The TEU, in the absence of ECBC, will monitor the IHF for chemical agents stored in the IHF prior to opening. The TEU may be tasked to train district or district designated personnel to perform surveillance monitoring. The TEU may also be tasked to perform periodic IHF monitoring during long-term storage.

(6) Inspect the IHF periodically for signs of deterioration or other damage that could lead to release of chemical agent.

(7) Provide first response during any emergency situations that occur during recovery, overpacking, transportation, and storage operations.

(8) Train personnel in IHF operations, including proper lifting techniques and hazard communication training for all chemicals used at the site.

d. ECBC. The responsibilities of the ECBC for IHF operations include:

(1) Provide direct support to the TEU.

(2) Perform laboratory analyses of samples to determine if chemical agent is present.

(3) Provide the TEU with material handling equipment, monitoring devices, and calibration solutions, as requested.

(4) Provide sampling capability (monitoring equipment and personnel) at the IHF for first entry monitoring.

e. USAESCH. The responsibilities of the USAESCH during IHF operations include:

(1) Provide direct support to the district in preparation of the site work plan and Safety Submission.

(2) Provide on-site expertise during site investigation.

(3) Conduct IHF vulnerability assessment.

11-4. General Requirements. General design and safety requirements for the IHF are discussed below.

a. Design of the IHF. The IHF is a storage building provided by PMNSCM and designed to hold RCWM. The IHF design is the product of PMNSCM and meets all storage parameters necessary for the temporary storage of RCWM. The specifications for the IHF are identified within the IHF Plan, one of PMNSCM's submittals for the Safety Submission.

b. IHF Security. Security for the IHF, when RCWM containing chemical agent or explosives are stored within, is the same as for Category II ammunition and explosives as described in AR 190-11, Physical Security for Arms and Ammunition. Surety measures are not applicable to RCWM items. The IHF should have the following physical security provisions:

(1) 24 hour guard force.

(2) Barriers.

(3) Lighting.

(4) Signs.

(5) Access control.

(6) Locks and Keys.

(7) Containment.

c. IHF Siting Plan. An IHF Siting Plan is required for all IHFs on a project site. The format for this plan can be located at the following website:
http://www.hnd.usace.army.mil/oew/policy/dids/didindx.html under DID OE-065.

11-5. Industrial Chemicals. Storage considerations concerning intact containers, other than ordnance configurations, which contain commercial chemicals such as chlorine, hydrogen cyanide, potassium cyanide, carbonyl chloride, cyanogen chloride, chloropicrin, etc. will conform to the requirements and guidance in AR 50-6 and practices which are generally acceptable for industrial operations.

# CHAPTER 12
# TRANSPORTATION OF RCWM

12-1. Introduction. This chapter documents the transportation and disposal procedures for RCWM.

12-2. Transportation Regulatory Requirements. Transportation operations of RCWM will follow DA and other regulatory guidelines. Some of the major requirements include:

a. Packaging, labeling, and manifesting the waste in accordance with 40 CFR 262.20 through 262.31.

b. Using the EPA identification numbers for the site as the generator of the hazardous waste and the identification number for the destination of the waste listed on the hazardous waste manifest.

c. Following applicable state, EPA, DOT, OSHA, and Army requirements for worker training and the transportation of hazardous waste.

d. Following security guidelines provided in AR 190-11 and AR 50-6.

e. Follow 50 USC 1512-1517.

12-3. Organizational Responsibilities.

a. PMCD. The PMCD has command responsibility to ensure that the RCWM is handled in a safe and environmentally acceptable manner. The PMCD has responsibility for overseeing RCWM handling activities such as monitoring, inspecting, labeling, documenting, loading, trans-loading, unloading, and transporting. A PMCD coordinator will be identified for this transportation effort to ensure all required coordination is conducted and responsibilities are fulfilled. Other PMCD responsibilities include:

(1) Developing a hazard analysis that addresses the relative risk associated with the planned transportation of RCWM. This analysis should identify variables that impact selection of landing areas and air corridors. In addition, the hazard analysis should assess transportation activities along the selected truck and air routes and risks associated with the vehicles or aircraft selected for this mission.

(2) Coordinating to ensure that all transportation operations are conducted in a safe and environmentally acceptable manner.

(3) Coordinating to ensure that the RCWM is properly packaged and repackaged, if required.

(4) Coordinating to ensure that standby decontamination and medical support is available during all phases of the transport operation.

(5) Coordinating RCWM movement with the TEU.

(6) Monitoring the status of the movement in coordination with the SBCCOM.

(7) Coordinating the Transportation Plan with the DHHS.

(8) Coordinating RCWM movement with the state emergency management agencies for all states along the transportation route.

b. District. The responsibilities of the executing USACE district with regard to RCWM transportation include:

(1) Providing proper notification to the USEPA and state regarding the transportation operation.

(2) Providing physical security and emergency response capabilities in direct support of TEU transportation activities.

(3) Signing the hazardous waste manifest as a generator of the RCWM (RCRA hazardous waste). As generator of the waste, the district retains accountability until the waste is transferred to the receiving arsenal.

(4) Notifying the National Response Center and the state officials of RCWM spills within the state, if releases exceed the reportable quantity.

(5) Providing communications equipment to be used by the TEU supervisor, site safety officer, and the PM while transferring the RCWM from the IHF to helicopter for off-site transport. The radios and telephones permit communications among key organizations and with emergency services organizations.

(6) Ensuring that the TEU has all required permits to transport hazardous materials/waste through each jurisdiction, as required.

(7) Providing transport vehicle(s) to move RCWM from the IHF to the embarkation point.

c. SBCCOM. The responsibilities for SBCCOM include the following:

(1) Arranging for all aircraft and providing trained crews required to support the Transportation Plan.

(2) Coordinating air transportation with the appropriate agencies.

(3) Transporting RCWM from the site to the final disposition site via helicopter and airplane.

(4) Operating an operations center to monitor the complete movement of RCWM to the arsenal for disposal.

(5) Implementing loading, trans-loading, and unloading plans for all operational activities.

d. TEU. The TEU is a specialized unit of the SBCCOM that has historically been the sole escort of RCWM as required by AR 50-6. TEU has the following responsibilities for transporting RCWM:

(1) Providing qualified escort personnel and trained emergency response teams to travel with the RCWM from the IHF until it reaches its final destination. The TEU will perform emergency response duties as required en route.

(2) Providing and operating chemical agent monitoring equipment for first entry, trans-loading, contingency, and confirmation monitoring.

(3) Ensuring that all personnel have completed required certification training prior to commencing the mission.

(4) Selecting specific equipment to load, trans-load, and unload cargo and prepare a SOP for its use. The TEU will be required to develop inspection criteria to ensure equipment is operable.

12-4. Transportation Plan. PMNSCM will provide a generic version of the Transportation Plan for inclusion in the Safety Submission. Once the project is operating and RCWM has been encountered, packaged, and placed in the IHF, a site-specific plan will be produced. This plan will address all transportation matters concerning the movement of the RCWM item from the exclusion zone to the IHF and from the IHF to its final destination point.

12-5. Chemical Accident or Incident Response Assistance (CAIRA) Procedures. If there is an accident or incident during handling, loading, or unloading of the RCWM, CAIRA procedures in Chapter 4 of AR 50-6 will be followed. TEU will usually be present during handling, loading, or unloading of RCWM on USACE projects and will assume operational control of this phase of the project. USACE contractors may be required to render assistance to TEU during these accidents or incidents in the form of personnel decontamination, logistical support, or other means as approved by the CO.

# APPENDIX A
# REFERENCES

A-1. Section I
Required Publications

Base Realignment and Closure Act of 1988, Public Law (PL) 100-526, 102 Stat. 2632.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, PL 96-510, 94 Stat 2767, 42 USC 9601

Defense Base Realignment and Closure Act of 1990, PL 101-510, 104 Stat. 1808.

Defense Environmental Restoration Program, PL 99-499, Section 211, 100 Stat 1719, 10 USC 2701 et seq.

Resource Conservation and Recovery Act (RCRA) of 1976, PL 94-580, 90 Stat 2796, 42 USC 6901, et seq., as amended

Superfund Amendment and Reauthorization Act (SARA) of 1986, PL 99-499, 100 Stat 1613, amending CERCLA, 42 USC 9601 et seq., and miscellaneous other sections

29 CFR 1910.120
OSHA Hazardous Waste Operations and Emergency Response

29 CFR 1926

OSHA Safety and Health regulations for Construction

40 CFR Part 260, et al
U.S. Environmental Protection Agency (EPA) Military Munitions Rule

40 CFR Part 300
EPA National Oil and Hazardous Substance Pollution Contingency Plan

49 CFR Part 172
Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information and Training Requirements

EP 75-1-3
4 Jan 02

DOD 6055.9-STD
Ammunition and Explosives Safety Standards

AR 40-5
Preventive Medicine

AR 50-6
Chemical Surety

AR 190-11
Physical Security for Arms and Ammunition

AR 200-1
Environmental Protection and Enhancement

AR 385-10
The Army Safety Program

AR 385-61
Army Toxic Chemical Agent Safety Program

AR 385-64
Ammunition and Explosives Safety Program

AR 405-90
Disposal of Real Estate

DA Pam 40-8
Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX

DA Pam 40-173
Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT

DA Pam 50-6
Chemical Accident or Incident Response and Assistance (CAIRA) Operations

DA Pam 385-61
Toxic Chemical Agent Safety Program

DA Memorandum
Interim Guidance for Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel, 5 Sept 1997

DA Memorandum
Applicability of Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel Response Activity Interim Guidance, 19 March 1998.

DA Memorandum
Approval of Safety Submissions for Non-Stockpile Chemical Warfare Materiel Response Activities, 29 February 2000.

ER 5-1-11
U.S. Army Corps of Engineers Business Process

ER 385-1-92
Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities

ER 385-1-95
Safety and Health Requirements for OE Response Action

ER 1110-1-12
Quality Management

ER 1110-1-8153
OE Response

ER 1110-1-8158
Corps-Wide Centers of Expertise Program

EP 75-1-2
Unexploded Ordnance (UXO) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Construction Activities

EP 200-1-2
Process and Procedures for RCRA Manifesting

EP 1110-1-18
OE Response

EP 75-1-3
4 Jan 02

EP 1110-1-24
Establishing and Maintaining Institutional controls for OE Projects

EP 1110-3-8
Public Participation in the Defense Environmental Restoration Program

EM 1110-1-4009
OE Response

EM 385-1-1
Safety and Health Requirements Manual

CESO-E Memorandum
Applicability of Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel, 13 April 1998

NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Activities."

A-2. Section II
Related Publications

A related publication is merely a source of additional information. The user does not have to read it to understand this pamphlet.

AR 385-40
Accident Reporting and Records

DA Pam 385-64
Ammunition and Explosives Safety Standards

TM 5-855-1
Fundamentals of Design for Conventional Weapons

USACE Supplement 1 to AR 385-40
U.S. Army Engineering and Support Center, Huntsville Safety Concepts and Basic Considerations for Unexploded Ordnance (UXO) Operations

HNC-ED-CS-S-98-1
Fundamentals of Design for Conventional Weapons

HNC-ED-CS-S-98-2
Method for Calculating Range to No More than One Hazardous Fragment per 600 Square Feet

# APPENDIX B
## PRE-OPERATIONAL SURVEY CHECKLIST

| AREAS TO BE CHECKED | LEAD | ACTION | YES/NO |
|---|---|---|---|
| 1. DEMONSTRATE | | | |
| A. PROOF OF EXECUTED EMERGENCY RESPONSE MOAS. | USAESCH | DISTRICT | |
| B. PROCEDURES (AUDITS) USED TO ENSURE COMPLIANCE WITH HAZARD REQUIREMENTS. | USAESCH | CONTRACTOR | |
| C. PROCEDURES AND DOCUMENTATION FOR ENSURING ACCOMPLISHMENT OF REQUIRED SAFETY AND HEALTH TRAINING AND SAFETY BRIEFINGS. | USAESCH | CONTRACTOR | |
| D. DUST MONITORING EQUIPMENT AND CALIBRATION, ENGINEERING CONTROLS FOR DUST. | USAESCH | CONTRACTOR | |
| E. VOC MONITORING EQUIPMENT AND CALIBRATION, ENGINEERING CONTROLS FOR VOCs. | USAESCH | CONTRACTOR | |
| F. EXCLUSION ZONE AND CONTAMINATION REDUCTION ZONE INGRESS/STAGING/EGRESS. | USAESCH | CONTRACTOR | |
| G. EMERGENCY VEHICLE INGRESS/STAGING/EGRESS. | USAESCH | TEU/ CONTRACTOR | |
| H. AVAILABILITY OF OVERPACKS. | USAESCH | TEU/PMNSCM/ CONTRACTOR | |
| I. EXECUTION OF TEU SUPERVISOR'S STATEMENTS AND OPERATOR'S STATEMENTS (OPLAN) | USAESCH | TEU | |
| 2. SHOW PROCEDURES (AND DOCUMENTATION) FOR ENSURING VISITOR QUALIFICATIONS AND CONDUCT VISITOR BRIEFING. | USAESCH | CONTRACTOR | |
| 3. VERIFY SECURITY MEASURES AND SECURITY GUARD SERVICES IN PLACE, VERIFY GUARD CHECK-IN PROCEDURES. | USAESCH | CONTRACTOR | |
| 4. VERIFY FIRE EXTINGUISHERS ARE ON-SITE, CHARGED, WORKERS TRAINED IN THEIR USE, DRILLS ARE CONDUCTED. | USAESCH | CONTRACTOR | |
| 5. RUN A D2PC COMPUTATION WITH EXISTING WEATHER CONDITIONS, COMPUTE NO EFFECTS ZONE. | USAESCH | TEU | |
| 6. SIMULATE HOT LINE OPERATIONS | USAESCH | TEU/ CONTRACTOR | |
| 7. SIMULATE AGENT OF CONCERN MONITORING. | USAESCH | ECBC/TEU | |
| **EMERGENCY RESPONSE** | | | |
| 1. DEMONSTRATE | | | |
| A. KNOWLEDGE OF WORKERS WITH CELL PHONE USE. | USAESCH | CONTRACTOR | |
| B. KNOWLEDGE OF WORKERS IN MUSTERING AT ASSEMBLY AREAS | USAESCH | CONTRACTOR | |

| AREAS TO BE CHECKED | LEAD | ACTION | YES/NO |
|---|---|---|---|
| C. EMERGENCY RESPONSE VEHICLES. | USAESCH | AMBULANCE | |
| D. POSTING OF EMERGENCY NUMBERS | USAESCH | ALL | |
| 2. DEMONSTRATE EFFECTIVENESS OF: | | | |
| A. WARNING SYSTEM(S) | USAESCH | CONTRACTOR/ TEU/ECBC | |
| B. POSTING OF HOSPITAL ROUTES. | USAESCH | CONTRACTOR | |
| C. POSTING OF EMERGENCY PHONE NUMBERS. | USAESCH | CONTRACTOR | |
| 3. VERIFY EMERGENCY EQUIPMENT IS ON-SITE, WORKERS ARE TRAINED IN ITS USE, AND OPERATIONAL DRILLS ARE (HAVE BEEN) CONDUCTED. | USAESCH | CONTRACTOR/ TEU/ECBC | |
| 4. VERIFY SPILL CONTROL EQUIPMENT IS ON-SITE, WORKERS ARE TRAINED IN ITS USE, DRILLS ARE (HAVE BEEN) CONDUCTED. | USAESCH | CONTRACTOR/ TEU | |
| 5. SIMULATE ON-SITE EMERGENCY RESPONSE (INCLUDING SOUNDING THE ALARM, MUSTERING, PERSONNEL ACCOUNTABILITY, EMERGENCY ASSESSMENT, HAZARD STABILIZATION, COMMUNITY NOTIFICATION, REMOVAL AND DECONTAMINATION OF VICTIMS, TRANSPORTATION TO MEDICAL FACILITY, INCIDENT STABILIZATION)FOR ONE OF THE FOLLOWING SCENARIOS. | | | |
| A. WORKER CONTAMINATED WITH AGENT OF CONCERN (INCLUDING RING OFF, DECONTAMINATION, EMERGENCY MEDICAL TREATMENT, TRANSPORTATION). | USAESCH | ALL | |
| B. NON-CWM, NON-TRAUMATIC CASUALTY (INCLUDING EMERGENCY MEDICAL TREATMENT AND TRANSPORTATION. | USAESCH | ALL | |
| C. AGENT OF CONCERN RELEASE. | USAESCH | ALL | |
| D. AGENT OF CONCERN ODOR DETECTED. | USAESCH | ALL | |
| **MONITORING** | | | |
| 1. VERIFY ENVIRONMENTAL MONITORING EQUIPMENT IS ON-SITE, WORKERS TRAINED IN ITS USE, CALIBRATION ACCOMPLISHED (IF REQUIRED). | USAESCH | CONTRACTOR/ ECBC/TEU | |
| 2. DEMONSTRATE READINESS OF CBDCOM MONITORING TEAM: | | | |
| A. AVAILABILITY AND CONFIGURATION OF MONITORING EQUIPMENT. | USAESCH | TEU/ECBC | |
| B. AVAILABILITY OF AGENT STANDARDS. | USAESCH | TEU/ECBC | |
| C. PPE | USAESCH | ALL | |
| D. CALIBRATION AND MONITORING DOCUMENTATION. | USAESCH | ALL | |
| 3. REVIEW HEAT/COLD STRESS MONITORING EQUIPMENT (INCLUDING CALIBRATION RECORDS), PROCEDURES AND DOCUMENTATION. | USAESCH | CONTRACTOR | |
| 4. REVIEW AGENT MONITORING EQUIPMENT (INCLUDING CALIBRATION), PERSONNEL QUALIFICATIONS AND PROCEDURES. | USAESCH/PM NSCM | CONTRACTOR/ TEU | |

| AREAS TO BE CHECKED | LEAD | ACTION | YES/NO |
|---|---|---|---|
| **DECONTAMINATION** | | | |
| 1. DEMONSTRATE AVAILABILITY OF DECONTAMINANTS. | USAESCH | CONTRACTOR/ TEU | |
| 2. DEMONSTRATE SAFETY AND EFFECTIVENESS OF: | | | |
| A. HEAVY EQUIPMENT DECONTAMINATION. | USAESCH | CONTRACTOR/ TEU | |
| B. HEAVY EQUIPMENT DECONTAMINATION AREA. | USAESCH | CONTRACTOR/ TEU | |
| C. RUNOFF CONTROL. | USAESCH | CONTRACTOR/ TEU | |
| D. MONITORING PROCEDURES TO ENSURE DECONTAMINATION. | USAESCH | CONTRACTOR/ TEU | |
| E. RECOVERY OF SUSPECT CWM FROM WORK ZONE. | USAESCH | CONTRACTOR/ TEU | |
| **MEDICAL** | | | |
| 1. DEMONSTRATE FIRST AID KITS (STATION) | USAESCH | CONTRACTOR | |
| A. QUALIFICATION OF ATTENDANTS. | USAESCH | CONTRACTOR | |
| B. MEDICAL LOG. | USAESCH | MEDICAL | |
| C. EMERGENCY EYE WASH/SHOWERS | USAESCH | CONTRACTOR/ TEU | |
| 2. DEMONSTRATE NOTIFICATION/ACKNOWLEDGEMENT OF EMERGENCY RESPONDERS. | USAESCH | DISTRICT/ CONTRACTOR | |
| 3. SHOW SAMPLE OF MEDICAL SURVEILLANCE RECORDS. | USAESCH | CONTRACTOR | |
| 4. DEMONSTRATE INFECTION CONTROL EQUIPMENT AND WASTE DISPOSAL. | USAESCH | CONTRACTOR | |
| 5. VERIFY CWM MEDICAL TRAINING OF EMERGENCY RESPONDERS AND MEDICAL SUPPORT PERSONNEL. | USAESCH/CBD COM | DISTRICT/ CONTRACTOR | |
| **PERSONNEL PROTECTIVE EQUIPMENT** | | | |
| 1. REVIEW PPE APPROVAL DOCUMENTATION, DEMONSTRATE AVAILABILITY OF PPE. | USAESCH/PM NSCM | CONTRACTOR/ TEU/ECBC | |
| 2. DESCRIBE PROCEDURES FOR DISPOSING OF PPE CONTAMINATED WITH AGENT OF CONCERN. | USAESCH/PM NSCM | CONTRACTOR/ TEU | |
| **DEMOLITION** | | | |

| | | | |
|---|---|---|---|
| 1. INSPECT DEMOLITION AREA. | USAESCH | CONTRACTOR | |
| **AREAS TO BE CHECKED** | **LEAD** | **ACTION** | **YES/NO** |
| 2. INSPECT EXPLOSIVES STORAGE AREA. | USAESCH | CONTRACTOR | |
| 3. DEMONSTRATE PRE-AND POST DEMOLITION SAMPLING ACTIONS. | USAESCH | CONTRACTOR | |
| * HFA HAD TAKEN A SOIL SAMPLE AT THE CLOSE OF OPERATIONS IN THE SAME DEMO AREA WE ARE GOING TO USE THIS PHASE OF OPERATIONS. WE CALLED V. CLINKENBEARD TO SEE IF THAT ENDING SAMPLE COULD BE USED FOR THE STARTING BASELINE FOR THIS PHASE AND SHE SAID YES. | | | |
| **INTERIM HOLDING FACILITY/AREA** | | | |
| 1. CONDUCT PRE-ACTIVATIONINSPECTION OF FACILITY. | USAESCH/PM NSCM | TEU | |
| 2. DEMONSTRATE IHF SECURITY PROCEDURES. | USAESCH/PM NSCM | TEU | |
| 3. VERIFY EMERGENCY TRAINING OF IHF RESPONDERS. | USAESCH/PM NSCM | TEU | |
| 4. DEMONSTRATE IHF: | | | |
| A. ANCHORING. | USAESCH/PM NSCM | TEU | |
| B. REFRIGERATION/WARNING AND BACKUP SYSTEMS, CONTINGENCY PLANS. | USAESCH/PM NSCM | TEU | |
| C. ELECTRICAL SAFETY | USAESCH/PM NSCM | TEU | |
| D. VENTILATION SYSTEM AND MONITORING EQUIPMENT. | USAESCH/PM NSCM | TEU | |
| E. PLACARDING. | USAESCH/PM NSCM | TEU | |
| F. FIRE PROTECTION. | USAESCH/PM NSCM | TEU | |
| G. TRANSPORTATION SAFETY EQUIPMENT. | USAESCH/PM NSCM | TEU | |
| H. OPEN/CLOSE PROCEDURES, INCLUDING FIRST ENTRY PROCEDURES. | USAESCH/PM NSCM | TEU | |
| I. CWM ARRIVAL ACTIVITIES. | USAESCH/PM NSCM | TEU | |
| J. CWM PRE-DEPARTURE ACTIVITIES. | USAESCH/PM NSCM | TEU | |
| 5. SIMULATE EMERGENCY RESPONSE FOR HAZARDS ASSOCIATED WITH AN IHF | USAESCH/PM | TEU | |

| | | | |
|---|---|---|---|
| CWM INCIDENT. | NSCM | | |
| **AREAS TO BE CHECKED** | **LEAD** | **ACTION** | **YES/NO** |
| 6. SIMULATE EMERGENCY RESPONSE FOR AN IHF FIRE INCIDENT. | USAESCH/PM NSCM | TEU | |
| 7. SIMULATE EMERGENCY RESPONSE FOR AN IHF MEDICAL EMERGENCY. | USAESCH/PM NSCM | TEU | |
| **TRANSPORTATION ACTIVITIES** | | | |
| 1. DEMONSTRATE AVAILABILITY OF TRANSPORTATION SUPPORT (COMMUNICATIONS, MEDICAL, SECURITY, MONITORING). | USAESCH/PM NSCM | TEU/ CONTRACTOR | |
| 2. SIMULATE CWM TRANSPORTATION: | | | |
| A. PRE-DEPARTURE ACTIVITIES. | USAESCH/PM NSCM | TEU/ CONTRACTOR | |
| B. EN ROUTE ACTIVITIES. | | | |
| C. PRE-ARRIVAL ACTIVITIES. | | | |
| D. ARRIVAL ACTIVITIES. | | | |
| E. LOADING ACTIVITIES. | | | |
| F. UNLOADING ACTIVITIES. | | | |
| G. TRANSLOADING ACTIVITIES. | | | |
| 3. DEMONSTRATE TRANSPORTATION EMERGENCY RESPONSE COMMAND AND CONTROL. | USAESCH/PM NSCM | TEU | |
| 4. SIMULATE EMERGENCY RESPONSE FOR: | | | |
| A. HAZARDS ASSOCIATED WITH A CWM TRANSPORTATION INCIDENT. | USAESCH/PM NSCM | TEU | |
| B. TRANSPORTATION FIRE INCIDENT. | | | |
| C. TRANSPORTATION MEDICAL EMERGENCY. | | | |
| D. TRANSPORTATION HAZARDOUS MATERIAL HANDLING INCIDENT. | | | |
| **CHARACTERIZATION AND PACKAGING** | | | |
| 1. SIMULATE: | | | |
| A. CWM CHARACTERIZATION<br>1. PINS<br>2. X-RAY<br>3. RAMANS | USAESCH/PM NSCM | TEU | |
| B. CWM MANIFESTING. | | | |
| C. CWM LABELING. | | | |

| AREAS TO BE CHECKED | LEAD | ACTION | YES/NO |
|---|---|---|---|
| D. POTENTIAL AGENT MONITORING, PACKAGING, AND SRC MONITORING. | | | |
| E. SCRAP METAL PROCESSING, INCLUDING MONITORING, DECONNING, AND DECON WASTE DISPOSAL. | USAESCH | TEU/ CONTRACTOR | |
| F. CONTAMINATED SOIL AND DEBRIS DECONTAMINATION:<br>1. PRECAUTIONS FOR HANDLING & STORING DECONS (MSDS, PPE, EMERGENCY RESPONDERS)<br>2. INLCUDE LIME OPERATIONS (MIXING) PACKAGING, AND TRANSPORTATION TO ON-SITE HOLDING AREA. | USAESCH | TEU/ CONTRACTOR | |
| G. DEMONSTRATE SAMPLING TECHNIQUES FOR CONTAMINATED SOIL. | | | |
| H. PREPARATION OF SOIL SAMPLES FOR SHIPMENT. | | | |
| ** NC INDICATES NOT CHECKED | | | |
| PRE-OP INSPECTORS | | | |
| NAME OFFICE<br>TELEPHONE | | | |

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF STAFF
200 ARMY PENTAGON
WASHINGTON DC 20310-0200

EPLY TO
.TTENTION OF

30 DEC 1998

DACS-SF

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Revised Policy for the Use of NIOSH-Certified Commercial Respirators with Chemical Agents

1. Reference:

a. AR 50-6, Chemical Surety, 1 Feb 95.

b. AR 385-61, The Army Chemical Agent Safety Program, 28 Feb 97.

c. DA Pam 385-61, Toxic Chemical Agent Safety Standards, 31 Mar 97.

d. DACS-SF memorandum dated 11 Sep 96, subject: Policy for the Use of N10SHCertified Commercial Respirators with Chemical Agents.

e. SCBRD-ODR-S memorandum dated 15 May 1995, subject: Commercial Chemical Protective Clothing - Guidance for Preparing a Request.

f. DACS-SF memorandum dated 7 May 1998, subject: Preparing a Request to Use Commercial Environmental Protection Agency Level B Clothing for Chemical Agent Operations.

2. In order to comply with Federal, Department of Defense, and Army safety and health standards, a policy was developed and issued in 1996 to allow the use of NIOSH-certified commercial, full-facepiece respirators for industrial operations in which the potential for personnel exposure to chemical agents (as defined in reference 1 a) may exist (reference 1 d). The intent of this policy is to allow users to tailor their requirements
and select the best available respiratory protection. Approval for the use of NIOSH-certified commercial, full-facepiece respirators gives Army commanders, contractors, and others more options to address the variety of chemical hazards that may exist both on and off Army installations. This policy does not prevent the use *of* existing Army protective masks.

3. The test plan contained in the 1996 policy has been revised by the Army Materiel Command's Chemical Agent Safety and Health Policy Action Committee (CASHPAC) Respirator Joint Working Group (JWG) and is enclosed. The revised test plan has been reviewed by and concurrence received from the Office of the Surgeon General,

DACS-SF
SUBJECT: Revised Policy for the Use of NIOSH-Certified Commercial Respirators with Chemical Agents

the U.S. Army Medical Command, the U.S. Army Soldier and Biological Chemical Command, and the U.S. Army Nuclear and Chemical Agency. As with the 1996 policy, industrial chemicals, such as chlorine, phosgene, cyanogen chloride, and hydrogen cyanide, are not within the scope of this policy. This policy is for respiratory protection in areas where exposure to chemical agent vapor or liquid is possible but is not expected. This revised policy applies to respirators only. Protective clothing will be as specified in references I b and 1c. Procedures for requesting approval of commercial protective clothing are delineated in references le and 1f.

4. Requests for use of NIOSH-certified commercial respirators with chemical agents will be submitted for approval to the Office of the Director of Army Safety, ATTN: -DACS-SF, 200 Army Pentagon, Washington, DC 20310-0200, with a copy furnished to the Technical Director, Edgewood Chemical Biological Center, ATT: SCBRD-ODR-S, Aberdeen Proving Ground, MD 21010-5423 for review. Requests must include all required information (e.g., test data and use scenario).

5. In order to prevent duplication of testing, the Edgewood Chemical Biological Center will maintain a file of respirator test results. Before testing, users should contact the Edgewood Chemical Biological Center Safety/Surety Office to determine what testing has already been performed for a particular respirator or if the respirator has already been approval for a specific use scenario.

6. This memorandum supercedes the 11 Sep 96 policy memorandum on this subject. Point of contact for this action is Mr. Jim Patton, 703/695-7294.

Encl

JAMES A. GIBSON
Senior Safety Manager
Office of the Director of Army Safety

DISTRIBUTION:
Commander in Chief, U.S. Army, Europe and Seventh Army, ATTN: AEAGA-S, Heidelberg, FRG, APO AE 09014
The Inspector General, ATTN: SAIG-ID, 1700 Army Pentagon, Washington, DC 20310-1700
continued

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SUBJECT: Revised Policy for the Use of NIOSH-Certified Commercial Respirators with Chemical Agents

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Deputy Chief of Staff for Operations, ATTN: DAMO-SSD, 400 Army Pentagon, Washington, DC 20310-0400
Assistant Chief of Staff for Installation Management, Office of the Director of Environmental Programs, ATTN: DAIM-ED, 600 Army Pentagon, Washington, DC 20310-0600
Project Manager for Chemical *Stockpile Disposal,* ATTN: SFAE-CD-SQ, Aberdeen Proving Ground, IVID 21010-5401
Project Manager for Non-Stockpile Chemical Materiel, ATTN: SFAE-CD-N, Aberdeen Proving Ground, MD *21010-5401*
Project Manager for Chemical Demilitarization, JACADS Field Office, ATTN: Safety Office, APO AP 9655MOO8
Chief, National Guard Bureau, Army Aviation and Safety Directorate, Arlington Hall Readiness Center, ATTN: NGB-AVN-S, 111 South George Mason Drive, Arlington, VA 22204-1382

Commander:
U.S. Forces Command, ATTN: AFPI-SO, Fort McPherson, GA 30330-6000
U.S. Army Materiel Command, ATTN: AMCCB, 5001 Eisenhower Avenue, Alexandria, *VA 22333-0001*
U.S. Army Materiel Command, ATTN: AMCSF, 5001 Eisenhower Avenue, Alexandria, *VA 22333-0001*
U.S. Army Soldier and Biological Chemical Command, ATTN: AMSBC-RA, Aberdeen Proving Ground, MD 21010-5423
U.S. Army Soldier and Biological Chemical Command, ATTN: AMSBC-SO, Aberdeen Proving Ground, *MD 21010-5423*
Anniston Chemical Activity, ATTN: SCBAN-CO, Anniston, AL *36201-4199*
Blue Grass Chemical Activity, ATTN: SCBBG-CO, Building S-56, 2091 Kingston Highway, Richmond, KY *40475-5008*
Deseret Chemical Depot, *ATTN:* SCBDE-CO, Tooele, *UT 84074-5000*
Dugway Proving Ground, ATTN: SCBDP-CO, Dugway, UT 84022-5000
Edgewood Chemical Activity, ATTN: SCBAB-CO, Aberdeen Proving Ground, MID 21010-5423
Newport Chemical Depot, ATTN: SCBNE-CO, Newport, IN 47966-0121
Pine Bluff Chemical Activity, ATTN: SCBPB-CO, Pine Bluff, AR *71602-9500*
Pueblo Chemical Depot, ATTN: SCI3PU-C0, Pueblo, CO 81001-5000
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Umatilla Chemical Depot, ATTN: SCBUL-CO, Hermiston, OR 97838-9544
Technical Escort Unit,'ATTN: SCBTE-CO, Aberdeen Proving Ground, MD 21010-5423
U.S. Army Industrial Operations Command, ATTN: AMSIO-SMA, Rock Island, IL 61299-6000
U.S. Army Industrial Operations Command, ATTN: AMSIO-DMU, Rock Island, IL 61299-6000
U.S. Army Industrial Operations Command, ATTN: AMSIO-IOA-A, Rock Island, IL 61299-6000
U.S. Army Test and Evaluation Command, ATTN: AMSTE-SI-SU, Aberdeen Proving Ground, MD 21005-5055
U.S. Army Garrison Aberdeen Proving Ground, ATTN: STEAP-LO-S, Aberdeen Proving Ground, MD -41005-5001
U.S. Army Garrison Aberdeen Proving Ground, ATTN: STEAP-PF-S, Aberdeen Proving Ground, MD 211005-5001
U.S. Army Space and Strategic Defense Command, ATTN: 6SSD-SA-S, PU Box 1500, Huntsville, AL 35807-3801
U.S. Army Corps of Engineers, ATTN: CESO-ZA, WASH DC 20314-1000
U.S. Army Training and Doctrine Command, ATTN: ATBO-S, Fort Monroe, VA 23651-5000
U.S. Army Nuclear and Chemical Agency, ATTN- MONA-CM, 7150 Heller Loop, Suite 101, Springfield, VA 22150-3198
U.S. Army Chemical School, ATTN: ATZN-CM-P. Fort McClellan, AL 36205
U.S. Army Military Traffic Management Command, ATTN* MTCS-SO, 5611 Columbia Pike, Falls Church, VA 22041-5050
U.S. Army Medical Command, ATTN: MCSM, Fort Sam Houston, TX 78234-6000
U.S. Army Center for Health Promotion and Preventive Medicine, ATTN: MCHB-TS-OFS, Aberdeen Proving Ground, MD 21010-5422
Eighth U.S. Army, ATTN: EASF, Seoul, Korea, APO AP 96205-0009
U.S. Army Pacific, ATTN' APPE-SA, Fort Shafter, Honolulu, H1 96858-5100
U.S. Army Pacific, ATTN: APOP-NC, Fort Shafter, Honolulu, HI 96858-5100
U.S. Army Pacific, ATTN: APLG-MUS, Fort Shafter, Honolulu, HI 96858-5100
U.S. Army Chemical Activity, Pacific, ATTN: APCA-ORM-0, APO AP 96558-0008
U.S. Army Military District of Washington, ATTN: ANOS. Bldg. 41, Fort Leslie J. McNair, Washington, DC 20319-5050
U.S. Army South, ATTN: SOSF, APO AA 34004-5000
U.S. Army Special Operations Command, ATTN: AOOS, Fort Bragg, NC 28307-5200
U.S. Army Intelligence and Security Command, ATTN: IAPER-HS, 8825 Beulah Street, Fort Belvoir, VA 22060-5246

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U.S. Army Criminal Investigation Command, ATTN: CISP-SA, 5611 Columbia Pike, Falls Church, VA 22041-5015
U.S. Army Safety Center, ATTN: CSSC-Z. Fort Rucker, AL 36362-5363

Director:
Edgewood Chemical Biological Center, ATTN: SCBRD-ODR-S,
Aberdeen Proving Ground, MD 21010-5423
U.S. Army Technical Center for Explosives Safety, ATTN: SIOAC-ES, McAlester, OK 74501
U.S. Army Defense Ammunition Center, ATTN- SIOAC-DO, McAlester, OK 74501
U.S. Army Defense Ammunition Center, ATTN: SIOAC-ASP, McAlester, OK 74501
U.S. Army Defense Ammunition Center, ATTN: SIOAC-DE, Savanna, IL 61074-9639
U.S. Army Defense Ammunition Center, ATTN: SIOAC-AV, Savanna, IL 61074-9639
U.S. Army Materiel Command Surety Field Activity, ATTN: AMXSA, Aberdeen Proving Ground, MD 21010-5423

## COMMERCIAL RESEIRATOR TEST MATRIX

Only NIOSH-certified commercial, full-facepiece respirators may be submitted for authorization to be used in operations where contact with chemical agents (defined in Army Regulation 50-6) is possible. Respirators that are not NIOSH-certified will not be considered. The most conservative NIOSH/OSHA/ANSI assigned protection factors will apply. Commercial respirators may only be authorized for use in low-level chemical agent concentrations. The maximum use concentration (MUC) will be the airborne exposure limit (AEL) multiplied by the assigned protection factor. The MUC for mustard and lewisite will not exceed the assigned AEL's (0.003 mg/m3).

Air-purifying respirators that are to be used in areas where contact with nerve, mustard, or lewisite agents is possible must undergo the following test.

### Section A. Test Plan for Agent Gas Life Testing of Commercial Organic Vapor Air-Purifying Respirator Filters

1. The test plan described herein is for the qualification testing of commercial organic vapor and combination air-purifying respirator filters for use in industrial-based operations involving potential exposure to chemical agents (as defined in AR 50-6). Organic vapor/acid gas filters used for mustard and lewisite operations must comply with the following testing.

2. The nerve agent simulant, dimethyl methylphosphonate (DMMP), shall be used as the challenge chemical. Test requirements are outlined in Table 1.

Table 1. DMMP Gas Life Test Requirements

| Challenge Concentration (mg/m3)a | Temperature (OCI | Relative Humidity M) | Test Condition | Sample Size |
|---|---|---|---|---|
| 200+/-15 | 25+/-3 | 50+/-5 | As-Received | 22 |
| 200+/-15 | 25+/-3 | 50+/-5 | Preconditioned [a] | 22 |

[a] Air, at 25 +/- 3 'C and 85 +/- 5% RH, passed through each filter for 16 hours

3. Test conditions:

a. Bench tests shall be made on an apparatus that allows the test atmosphere as

described in Table 1 to enter the filters continuously at airflow rates specified herein, and that has means for determining the test life of the filters. Data shall be provided that demonstrates the test system is capable of accurately measuring the DMIVIP break point concentration at the effluent side ofa filter.

b. Twenty-two filters shall be removed from their containers and tested as is (19as received" filters).

c. Twenty-two filters shall be equilibrated at 25 +/- 3 *C by passing 85 +/- 5 % relative humidity air at +/- 50 % of the test airflow rate through the filters for 16 hours ("preconditioned" filters).

d. All preconditioned filters shall be capped/resealed and placed in airtight plastic bags for storage, kept in an upright position, at room temperatures, and tested within 18-48 hours.

e. All axial-flow filters shall be tested such that the direction of airflow is parallel to the floor.

f. The foliowing continuous airflow rates shall be used to *test individual filters:

1) 32 2 lpm for air purifying respirators with dual filters
2) 64 3 lpm for air purifying respirators with a single filter
3) 64 3 lpm for powered air-purifying respirators with dual filters certified at 4 cfm
4) 85 +1- 4 lpm for powered air-purifying respirators with dual filters certified at 6 cfim (loose fitting hood/helmets only)

NOTE: Some respirators may use filter configurations that differ from those specified above. In every case, the test airflow rate shall be equivalent to the flow through each filter when the respirator is operated at its maximum certified and/or approved flow rate.

g. Minimum DMMP gas life shall be 60 minutes. The test shall be stopped after 60 minutes or at the break point (break-through time), whichever occurs first The break point shall be the time needed to attain an effluent concentration of 0.0001 mg/m3.

h. DMMP test reagent shall be a minimum of 96% purity. DMMP may be purchased from Albright and Wilson, Americans, P.O. Box 26229, Richmond, VA 23260 or Aldrich Chemical Co., Inc., P.O. Box 2060, Milwaukee, W1 53201.

***Section B. Other Considerations***

1. Chemical Protective Hood:

Use scenarios involving potential exposure to liquid chemical agents (or to chemical

agent vapors above the airborne exposure limit (AEL)), shall require the respirator to be wom with a hood resistant to chemical agents. The hood shall be constructed of agent resistant material(s) and be fully compatible with the respirator. The inlets of the filters may not be covered by the hood material. Hoods previously approved by the U.S. Army for chemical agent operations may be used if demonstrated to be compatible with the respirator under review and with conditions likely to be encountered by the worker, as per the use scenario. 'Hood compatibility shall be evaluated by the U.S. Army Soldier and Biological Chemical Command (SBCCOM)/Edgewood Chemical Biological Center (ECBC) personnel. An example of an agent-certified hood is the one developed by the Army for the Chemical Stockpile Emergency Preparedness Program (CSEPP) for use with powered air-purifying respirators (PAPRs). This hood (Purchase Description EA-H-1 881) was designed to accommodate full-facepiece commercial PAPRs equipped with large one-piece panoramic lenses. The hood is constructed of a lightweight butyl coated nylon cloth (reference MIL-C-51251). Another example is the hood developed for use with self-contained breathing apparatus (SCBA) to be used in conjunction with Modified Level A. The Modified Level A hood is constructed of a heavier weight butyl coated nylon cloth (reference MIL-C-12189). Hoods made of materials not previously agent-certified shall be tested for permeation resistance against liquid chemical agent challenges of HD, GD, VX, and L at a challenge density of 12 g/m2. Twenty-two swatches shall be randomly selected from a given production lot of the hood material and tested with each agent. All swatches will be tested in accordance with closed-cup test methods for nonporous materials of TOP 8-2-501 for 4 hours at a temperature of 90 $^{O}$F.

2. Mustard and Lewisite Operations: Respirators proposed for use in operations that involve the potential for low-level (0.003 mglm3 or lower) exposure to mustard or lewisite shall be N10SH-certified for protection against organic vapors and hydrogen chloride (i.e., respirators equipped with NIOSH-certified combination organic vapor/acid gas filters). The filters shall be tested in accordance with the DMMP gas life test plan for organic vapor filters, above.

3. Particulate Exposure Hazards: Respirators to be worn for protection against chemical agent aerosol and/or respirable industrial particulate hazards (e.g. dust, fumes, and mists) shall be equipped with the appropriate N10SH-certified particulate combination filters. The class and filtration efficiency level of the filter (i.e., particulate filter type) shall be selected based on the contaminant exposure hazard anticipated (e.g. asbestos, oil mist, toxic metal fumes, etc). The combination filters shall be tested in accordance with the DMMP gas life test plan for organic vapor filters, above.

**Section C. Instructions for Using the Commercial Respirator Test Matrix**

1. The information described above provides the test requirements that commercial NIOSH-certified full-facepiece respirators must undergo before obtaining Department of the Army (DA) approval for use. Approval by HQDA Office of the Director of Army Safety (ODASAF) and HQDA Office of the Surgeon General (OTSG) will be based on

whether test results are adequate to authorize the respirator for conditions outlined in the "use scenario." The "use scenario" shall be composed of information describing how the respirator will be used, i.e., the specific type of operation.

2. The manufacturer of the commercial respirator may perform these tests to gain the Army's approval to use their respirator in the "use scenarios."

3. All respirators must be tested as specified above, unless HODA ODASAF and HQDA OTSG have approved a deviation from this requirement.

4. Each installation/requester will be responsible for obtaining all maintenance support, i.e., logistics and training. It is recommended that this type of support be made part of the purchase contract with the respirator manufacturer. Innovative approaches, such as two installations purchasing the same respirator and sharing maintenance support, are encouraged.

5. Approval Process:

a Each requester shall forward all test data and the "use scenario" to HQDA GDASAF. The HODA ODASAF will forward the request to the Chemical Agent Safety and Health Policy Action Committee (CASHPAC) which has a working group established to review the submitted information. The working group will provide a recommendation to the CASHPAC, which will review and forward a recommendation to HODA ODASAF. HODA ODASAF will staff the recommendation with the HODA OTSG before granting approval/ disapproval to the installation/requester.

b. Required Information:

1) Each installation/requester will prepare and submit a detailed "use scenario." The use scenario will include the following:

a) Type, duration, and frequency of operations performed (i.e., work activities).

b) Types and potential airborne concentrations of chemical agents which may be involved.

c) Types and potential airborne concentrations of commercial chemicals involved.

d) Type of near real-time monitoring that will be conducted during operations.

e) Steps that will be taken should the monitor alarm.

Whether or not there is potential for contact with liquid chemical agents

g) A risk assessment/ hazard analysis, which was developed for the specific use scenario." A detailed scenario allows each installation/ requester to choose a respirator that meets their requirements. 'Commercial respirators may only be used in low-level chemical agent atmospheres which do not exceed the MUC stated above; therefore, accurate continuous near real time monitoring with alarm is essential.

2) All respirator be submitted. Additionally, a statement certifying that the test matrix was followed without test results (raw data) will deviations will be submitted.

3) A technical point of contact that can answer questions regarding the installation/requester's submission will be provided.

**Section D. Preparation Guide for Commercial Respirator Request Submission**

1. Title of Request.

2. Respirator Description. Completely describe the respirator. Include the type of filter(s), the respirator's capabilities, and the NIOSH certification number

3. Use Scenario(s). Fully describe how the respirator will be used, to include the information in section C.5.b.

4. Spares and Repairs. Discuss your plan for maintaining the respirators.

5. Test Summary.

a. Discuss the results of all testing. Mention that the respirator is NIOSH-certified and include a copy of the manufacturer's statement of NIOSH-certification.

b. Discuss the DMMP testing. Provide the test data and discuss the suitability of the respirator for the type of work to be performed. Also discuss any limitations based on the test data.

c. Discuss the chemical agent swatch tests for a protective hood, if applicable (see Section A, para 1, above). Be certain that the testing performed on the hood material matches the use scenario. For instance, if your scenario has the potential for exposure to liquid lewisite then you must have test data that demonstrates the effectiveness of the material to protect against that hazard. You should obtain a copy of the test data (if already performed) from the hood manufacturer and review it for applicability. If additional testing needs t6 be performed then discuss the results of that testing (see Section A, para 1, above).

6. Hazard Analysis. A hazard analysis of the use scenario must be performed. If the use scenario has a standing operating procedure (SOP) then there should be a hazard analysis for that SOP. This should be included.

7. Test Data. If you are using existing test data then you should indicate that here, otherwise all of the test data must be forwarded as an enclosure.

APPENDIX D

**DEPARTMENT OF THE ARMY**
**OFFICE OF THE CHIEF OF STAFF**
**WASHINGTON, DC 20310-4200**

**REPLY TO**
**ATTENTION OF**

DACS-SF

11 April 1994

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Use of Commercially Available Chemical Protective Clothing

1. In order to comply with federal, Department of Defense and Army safety standards, the Deputy Assistant Secretary of the Army (Environment, Safety and Occupational Health) has authorized the Director of Army Safety to develop a program to allow the use of commercially available chemical protective clothing during toxic chemical operations. This action was in response to a request from the U.S. Army Materiel Command, which highlighted the need to expand the Army inventory of available protective clothing and comply with Occupational Safety and Health Administration (OSHA) requirements.

2. The enclosed matrix, developed by technical experts from the Edgewood Research, Development and Engineering Center (ERDEC) and the Chemical Materiel Destruction Agency identifies the testing necessary to allow the use of commercially available protective clothing in toxic chemical operations. The matrix requires specific testing and the development of a "use scenario." Once completed, the test data and "use scenario" must be submitted to Chief of Staff ' ATTN: DACS-SF, 200 Army Pentagon, Washington, DC 20310-0200 for final review and approval.

3. One key feature of the test matrix is that the commercial protective clothing need not pass each testing requirement, but only those requirements identified as essential under the "use scenario." A protective suit, for example, need not pass the National Fire Protection Association flammability resistance test if the suit is not used in a flammable area.

4. This policy does not prevent the use of existing. Army chemical protective clothing. Rather, the use of commercially available protective clothing is intended to give Army employees, contractors and others involved in toxic chemical operations more options to address the wide mix of chemical hazards which exist both on and off Army installations. This initiative will allow users to tailor their requirements and select the best available chemical protective clothing.

5. In order to prevent duplication of approval testing, ERDEC will maintain a file of commercially available clothing test results. Before testing, users should contact the Director, ERDEC, ATTN: SCERD-ODR-S, Aberdeen Proving Ground, MD 21010-5423 to determine what testing has been done, or if a commercially available product has already completed testing.

6. This action was coordinated with the Deputy Chief of Staff for Operations and Plans, the Deputy Chief of Staff for Logistics, the Judge Advocate General and The Surgeon General. The point of contact for the Army Safety Office is Mr. Cliff Dunseth, ATTN: DACS-SF, (703) 695-7291 or DSK 225-7291.

Michael E. Thomas

Encl

MICHAEL E. THOMAS
Colonel, GS
Deputy Director of
Army Safety

DISTRIBUTION:

Commander, U.S. Army Materiel Command, ATTN: AMCSF/AMCCE/AMCSG, Alexandria, VA 22333-0001

Commander, U.S. Army Forces Command, ATTN: FCJ1-SO/FCG3-OC, Fort McPherson, GA 30330-6000

Commander, U.S. Army Training and Doctrine Command, ATTN: ATOS, Fort Monroe, VA 23651-5000

Commander, U.S. Army, Pacific, ATTN: APPE-SA, Fort Shafter, HI 96858-5100

Commander, U.S. Army Corps of Engineers, ATTN: CESO/CEMP-R, 20 Massachusetts Avenue NW, Washington., DC 20314-1000

Commander, U.S. Army Chemical Materiel Destruction Agency, ATTN: SFIL-CMS, Aberdeen Proving Ground, MD 21010-5001

Commander, U.S. Army Medical Research and Development Command, ATTN: SGRD-RML-S, Frederick, 21702-5012

Commander, U.S. Army Nuclear and Chemical Agency, ATTN: MONA-CM, 7150 Heller Loop, Suite 101, Springfield, VA 22150- 3198

Director, Edgewood Research, Development, and Engineering Center, ATTN: SCBRD-ODR-S Aberdeen Proving Ground, MD 21010-S423

Director, U.S. Army Technical Center for Explosives Safety, ATTN: SMCAC-SE, Savanna, IL 61074-9639

CF: (w/o encl)
SAILE-ESOH
DAMO-FDB
DAIM-ED-R
DALO-SMA
SGTS-PSP
DAJA-EL


# USAMC CHEMICAL AGE NT SAFETY & HEALTH POLICY ACTION COMMITTEE

# (CASHPAC)

# PROTECTIVE CLOTHING TEST MATRIX PROPOSAL

# 22 NOVEMBER 1993

## COMMERCIAL CHEMICAL PROTECT CLOTHING TEST MATRIX

Commercial chemical protective clothing must he tested against the following mandatory requirements:

NFPA 1991
OSHA 1910.120
Swatch Test
Man-In-Simulant Test
Decontaminability

The choice of appropriate chemical protective *clothing is based on* many factors to include the "use scenario". A detailed description of how and where the suit will be worn must first be developed. The clothing will then be tested against the requirements. Some of the mandatory tests may be optional depending on the scenario i.e., if clothing will not be reused then decontaminability testing may not be required. Also, if - a suit f ails a test or a portion of a test this does not mean that the suit has failed as a whole if the use scenario allows for the failure. For example, a suit fails the flammability resistance test (NFPA 1991). Approval to use the suit may still be granted *with* the contingency that it is not used in a flammable area.

Test Descriptions:

Chemical Protection –

NFPA 1991 – (new and abrasion conditioned)
- Overall Suite Water Penetration Test
- Chemical Permeation Resistance Test
- Flammability Resistance Test
- Abrasion Resistance Test
- Cold Temperature Performance Test
- Penetration Resistance Test
- Exhaust Valve Inward Leakage Test
- Exhaust Valve Cracking Pressure Test
- Luminous Transmittance Test

Swatch Tests (Worn & Unworn) - TOP 8-2-501
- (1) Wear Testing
- (2) Swatch/Component Testing (HD, GB, VX, L @ 12 $g/m^2$)

OSHA 1910.120 –
- Totally-Encapsulating Chemical Protective Suit Press Test
- Totally-Encapsulating Chemical Protective Suit Qualitative Leak Test

Reuse after Vapor Contamination (Decontaminability: reuse after exposure to vapor)

Man-In-Simulant

Other Considerations:

Microclimatic Cooling (does heat stress management provided meet mission)

Environment –
- Electromagnetic – MIL-STD-461
- Hot and Cold – (range of 0 to 100°F)

Human Factors -

Donned/doffed with one assistant
Compatibility with IMHE, tools, equipment
Anthropometric data
Compatible with existing communications equipment

Breathing Capability -

NIOSH approved SCBA

Detailed Description of Tests:

A. NFPA 1991, Standard an Vapor-Protective Suits for Hazardous Chemical Emergencies

NFPA 1991 addresses vapor -protective suits designed to protect emergency response personnel against exposure to specified chemicals in vapor and liquid splash environments during hazardous chemical emergencies. The NFPS 1991 battery of chemicals are specified in ASTM F 1001. The standard includes performance requirements that were established to reflect simulated use conditions.

- A suit pressurization test is used to check the air-tight integrity of each suit.
- An overall suit water penetration test is designed to ensure the suit provides full body protection against liquid splashes.
- Primary materials must resist permeation for one hour or more by each chemical
- Also included are penetration resistance testing of closures, and leak and cracking pressure tests for exhaust valves.
- Material testing for burst strength, tear strength, abrasion resistance, flammability resistance, cold temperature performance, and flexural fatigue are required so that materials used for vapor-protective suits will afford adequate protection in the environment where they will be used.

1. Overall Suit Water Penetration Test

Each vapor-protective suit will meet the "pass" requirements of *ASTM F 1052, Practice for Pressure Testing Of Gas-Tight Totally Encapsulated Chemical Protective Suits.* Test scenerio: A, *human* form mannequin (water resistant) dressed in suit with an inner garment covering all areas of the mannequin as an aid to observe water penetration. Five nozzles in required positions will deliver water (minimum of 3 liter/minute through each nozzle) for 15 minutes for each of the suit orientations specified. Any evidence of wetness on the inner garment constitutes a failure.

2. Chemical Permeation Resistance Test

This test measures the permeation resistance of the suit material for 3 hours against each chemical in the NFPA battery of chemicals, and any additional chemicals or mixtures. Permeation resistance will be measured in accordance with ASTM F 739, *Test Method for Resistance of Protective Clothing Materials to Permeation by Liquids and Gases*, at 77°F. The minimum detectable permeation rate will be less than or equal to 0.14 ug/cm'/min for all permeation resistance tests. In the permeation test apparatus, the protective clothing material specimen partitions the test chemical from the collection medium. The collection medium, which may be liquid or gas, is analyzed quantitatively for its concentration of the chemical and thereby the amount of that chemical that has permeated the barrier.

3. Flammability Resistance Test

All tests samples will be conditioned for not less than four hours in standard atmospheric conditions and will be tested not more than 5 minutes after removal from conditioning. Specimens will consist of at least 10 material samples and will be folded. A stopwatch will be started and the tip of the f lame will

be applied to the end until it is ignited, but no longer than 3 seconds. If specimen fails to ignite in 3 seconds, then reapply flame for an additional 12 seconds. Different results are then noted.

4. Abrasion Resistance Test

This testing will be conducted IAW ASTM D 4157, *Test Method for Abrasion Resistance of Textile Fabrics.* The specimen will be abraded for 25 continuous cycles. The permeation test specimen will be taken from the exact center of the abraded sample. Permeation resistance testing will be substituted for abrasion to rupture and percentage loss in breaking load for interpreting abrasion resistance test results.

5. Cold Temperature Performance Test

Cold temperature performance will be measured in accordance with ASTIM D 1043, *Test Method for Stiffness Properties of Plastics as a Function of Temperature by Means of a Torsion Test.* The modulus of rigidity will be measured over the range of test temperature and specifically reported at – 13°F.

6. Penetration Resistance Test

Penetration resistance testing of suit closure assemblies will be conducted IAW ASTM F 903. A minimum of three suit closure assemblies will be tested for each of the NFPA battery of chemicals. The suit closure will be preconditioned by 50 cycles of completely opening and completely closing the closure assembly. The suit closure to be tested will be contacted with test chemicals (5 minutes at $P_{atm}$ 1 minute at 2 psig, and 54 minutes at $P_{atm}$). The test cell will be modified to accommodate the shape of the suit closure assembly. observed or detected liquid penetration at one hour or less will constitute failure of this test.

7. Exhaust Valve Inward Leakage Test

Suit exhaust valves will be conditioned at 901F at a relative humidity of 50% for a minimum period of 4 hours. Valves will be tested not more than 5 minutes after removal from conditioning. With the exhaust valve mounted in the test fixture, a suction of 1.0 inch water gauge pressure will be applied to the side of the valve *representing the* suit interior for 30 seconds while the flow rate into the valve is measured.

8. Exhaust Valve Cracking Pressure Test

Cracking pressure will be measured for a minimum of 12 samples suit exhaust valves that have been conditioned as above. With the exhaust valve mounted in the test fixture the static pressure and the valve interior will be systematically increased while the flow rate out of the valve is measured. Pressure will be increased until a flow rate of 6.10 in3/min is measured.

9. Luminous Transmittance Testing

Luminous (visible) transmittance will be measured IAW ASTM 0 1003. Luminous transmittance will be determined by measuring the spectral transmittance and calculating the luminous transmittance through the use of published data on special radiant energy and the relative luminous efficiency of the average eye.

B. Swatch Tests

Swatch /components from worn suits will be tested for penetration resistance against liquid challenges of HD, GB, VX, L (and DS2) at a challenge density of 12 $g/m^2$. Ten worn suits will be randomly selected and dedicated to testing with each agent. Two swatches/components will be taken from each suit at locations listed below except for the pass-thru for which only one per suit is available. All swatches will be tested IAW closed-cup test methods for nonporous materials of TOP 8-2-501 for 4 hours at a temperature of 90 DEG F. In addition, two swatches of control fabric will be included in every trial. These swatches will also provide baseline data for fabric in new condition.

Sampling Locations:

| Swatch | Component |
|---|---|
| Knee | Glove/Cuff |
| Elbow | Pass-thru |
| Seat | Tether Air Supply Hose |
| Back | Coolant Hose |
| Shoulder | Zipper |
| Visor | Exhaust Valve |
| Visor/Garment | |
| Garment/Garment | |

C. OSHA 1910-120, App. A -

1. Totally-Encapsulating Chemical Protective Suit Pressure Test

This test measures the ability of a gas tight totally-encapsulating chemical protective suit material, seams, and closures to maintain a fixed positive pressure. The suit is visually inspected and modified for the test. The test apparatus is attached to the suit to permit inflation to the pre-test suit expansion pressure for removal of suit wrinkles and creases. The pressure is lowered to the test pressure and monitored for three minutes.

2. Totally-Encapsulating Chemical Protective Suit Qualitative Leak Test

This test semi-qualitatively tests gas tight suit integrity by detecting inward leakage of ammonia vapor. Since no modifications are made to the suit to carry out this test, the results from this practice provide a realistic test for the integrity of the entire suit. The volume of concentrated aqueous ammonia solution required is calculated based on the size of test area, etc. The suit is donned by a person wearing respiratory equipment. The ammonia solution is poured into an open pan and a 2-minute evaporation

period is observed before the test room concentration is measured. When the concentration is between 1000 and 1200 ppm, the individual starts a standardized exercise protocol to stress and flex the suit. After completing the protocol, the room concentrations is measured again. The individual exits the room and the ammonia concentration is measured inside the suit. The intrusion coefficient of the suit can be calculated by dividing the average test area concentration by the interior suit concentration.

D. Reuse After Vapor Contamination

This test demonstrates whether the suit can be decontaminated and reused after exposure to chemical agent vapor. The testing will be done with GB, HD, VX, and Lewisite. A total of 30 suits will be tested. The worn suits are placed on manikins for exposure to agent for 4 hours and at concentrations determined by the D2PC. The suits will be deconned, bagged for at least 4 hours and the bag will be tested to verify the vapor concentrations are below the permissible levels. They will be worn for one additional wear mission, undergo visual inspection and pressure checks, and then be sampled for liquid agent swatch testing (testing will be done with same agents and scheme as B).

E. Man-In-Simulant

MIST is done with one simulant TBO and at concentrations determined and will be equivalent to the maximum credible HD event for a ventilated igloo scenario. A total of 20 suits - 10 new and 10 worn. Worn suits will be those that have accrued 4 wear missions. Simulant concentration inside the suit will be monitored at a maximum of 3 locations. Sequential sampling of locations will be used to minimize effect on the air volume being monitored. As a minimum, activity will consist of a set of repetitive exercises for a period of 4 hours. For each suit tested, concentration readings over the 4 hour monitoring period will be used to calculate a TWA concentration at each sample location. Statistical analysis will follow to determine probability of occurence and expected magnitudes for each agent of interest if any penetrations are detected.

OTHER CONSIDERATIONS:

Electromagnetic

This test measures radiated emissions of the systems components IAW MIL-STD-462. Components of interest for this test include the microclimatic cooling system and the emergency breathing apparatus. The test also includes observing degradation in electronic equipment/radio communications during testing which is indicative of excessive electromagnetic emissions.

Hot and Cold

Consideration should be given as to whether the system is designed and constructed for use in a site determined temperature range.

CONTRACTOR SITES

Arvin/Calspan
P.O. Box 400
Buffalo, NY 14225
(716) 631-6923
FAX (716) 631-6815
(716). 592-7331 (Ashford)
FAX (716) 592-7529
Mr. Mike Moskal .

Battelle
505 King Avenue
Columbus, OH 43201
(614) 424-5393
FAX (614) 424-4905

ETG, Inc.
1400 Taylor Avenue
Baltimore, MD 21284-9840
(410) 321-5200
FAX (410) 321-5255
Mr. John Schmidt

IIT Research Institute
10 West 35th Street
Chicago, IL 60610
(312) 567-4267
FAX (312) 567-4286
Dr. Jack O'Neill

Southern Research Institute
2000 Ninth Ave South,
P.O. Box 55305
Birmingham, AL 35255-5305
(205) 581-2515
FAX (205) 581-2726
Mr. Josiah Smith
(205) 581-2661
Mr. Reuben Watkins
(205) 581-2514
Mr. Jeff Smith

Truetech, Incorporated
680 Elton Avenue
Riverhead, NY 11901
(516) 727-8600
FAX (516) 727-7592

GEOMET Technologies
8577 Atlas Drive
Gaithersburg, MD 20877
(301) 417-9605
FAX (301) 990-1925
Mr. Frank Kelly

Midwest Research Institute
425 Volker Boulevard
Kansas City, MO 64110
(816) 753-7600
FAX (816) 753-8420
Ms. Hope Green

MAN-IN-SIMULANT TEST SITES

Dugway Proving Ground
Edgewood Research Development
and Engineering Center
Battelle

## INSTRUCTIONS FOR USING PROTECTIVE CLOTHING TEST MATRIX

The enclosed information provides each installation with the test requirements that commercial protective clothing must undergo before obtaining Department of Army Safety approval for use. DA Safety approval will be based on the results of the testing as well as whether the suit meets the site specific "use scenario". The "use scenario" will be composed of information describing how the clothing will be used i.e., in chemical agent igloos containing unknowns, in flammable areas, for excavations, with chemical agents and reusable/non-reusable.

All commercial protective clothing must be tested against the five major test areas unless DA Safety has approved a deviation from this requirement. An example of this might be that an installation plans on disposing of used suits thereby negating the need to perform the decontaminability test. The desire to dispose of all suits would have to be contained in the "use scenario". Also, the failure of a suit to pass a particular test does not mean that the suit can not be used. For example, if a suit fails the decontaminability test then the DA Safety approval would be contingent upon disposing of all used suits.

Each installation will be responsible for obtaining all maintenance support i.e., logistic, training. It is recommended that this type of support be made part of the purchase contract with the commercial protective clothing manufacturer. Innovative approaches, such as two installations purchasing the same suit and sharing maintenance support, are encouraged.

Approval Process:

Each installation will forward all test data and the "use scenario" to DA Safety for approval. The DA Safety will forward the request to the CASHPAC which has a working group established to review the submitted information. The working group will provide a recommendation to the CASHFAC for forwarding to DA Safety. The DA Safety will then coordinate the recommendation with the Office of The Surgeon General and the Deputy Chief of Staff for Operations before providing approval/ disapproval to the installation. The U.S. Army Technical Center for Explosive Safety will be the repository for all submitted information.

Required Information:

1. Each installation will prepare and submit a "use scenario." This scenario-should be detailed enough so that the reviewers can ascertain whether any requested deviations from testing can be approved. A detailed scenario also allows each installation to chose a suit that meets their requirements and offers flexibility in the test arena.

2. All test results (raw data) will be submitted as well as a statement that there were no deviations in the manner in which the tests were conducted.

3. A technical point of contact that can answer questions regarding the installation/activities request will be provided.

# USAMC CHEMICAL AGENT SAFETY & HEALTH POLICY ACTION COMAITTEE (CASHPAC)

# EPA LEVEL B PROTECTIVE CLOTHING TEST CRITERIA

## JANUARY 1998

## COMMERCIAL CHEMICAL PROTECTIVE CLOTHING TEST CRITERIA

Commercial chemical protective clothing must be tested against the following mandatory requirements:

Liquid challenge/Vapor Penetration Test
Aerosol Test
Decontaminability Test

The choice of appropriate chemical protective clothing is based on many factors to include the "use scenario". A detailed description of how and where the clothing will be worn must first be developed prior to determining the extent of testing. The clothing will then be tested against the requirements. Users should consider all potential uses and ensure that the chosen Level B clothing is compatible. For instance, if the use scenario requires suit contact with sharp objects (digging or crawling in dirt), then the user should be able to demonstrate via test data that the suit material will stand up to this type of use. Some of the mandatory tests may be optional depending on the scenario , i.e., if clothing will not be reused when decontaminability/reuse testing may not be required.

Test Descriptions:

Chemical Agent Protection -

Swatch Tests - TOP 8-2-501 (modified)
Liquid Challenge/Vapor Penetration
(using appropriate chemical agent at the required protection level)

Decontaminability

Aerosol Test

Other Considerations: These areas must be addressed and information or data provided.

Suit Reuse

Material Strength - Resistance to abrasion, tearing, or ripping

Microclimatic Cooling (does heat stress management provided meet mission)

Environment -
Electromagnetic – MIL-STD-461
Hot and Cold - (Range of 0 to 100° F)

Human Factors -
Donned/doffed with one assistant

Compatibility with MHE, tools, equipment
Anthropometric data
Compatible with existing communications equipment

Breathing Capability -
NIOSH certified

Flammability Resistance

**Detailed Description of Tests:**

A. Liquid Challenge/Vapor Penetration

This testing is conducted to measure the actual permeation of chemical agents (agent type is determined from the use scenario) through $watches taken from the suits. As a minimum. through swatches are taken from six different areas of the suit. Each swatch is placed in a test cell (MIX material swatches per test cell and one control swatch) and is exposed to a predetermined liquid agent challenge (based on the use scenario) that is applied to the top surface of the swatch. The sampling times (hours) and intervals (minutes) are determined based on the protection requirement resulting from the use scenario(s). A sample is sequentially drawn from the air flowing below each swatch by a MINICAMS which determines the amount of agent vapor that has penetrated the swatch. With these measurements and knowing the area of the test swatches, it is possible to determine the nanograms per square centimeter (ng/=2) that permeate each swatch over time (hours), The test methodology can be found in Appendix A. Swatch te3ting of suit components ouch as the glove/ cuff and zipper/ suit interface, exhaust valve, or any other material penetrations or interfaces should be performed.

Example Sampling Locations:

Swatch
Knee
Elbow
Seat
Back
Garment/Garment

B. Decontaminability Test

This test will demonstrate that the suit. can be decontaminated and disposed of in a safe marine.-. The use 3cenario will determine which agents and vapor contamination requirements are appropriate. The suit is placed on a mannequin for exposure to agent (at the required vapor contamination) and at concentrations determined by the use scenario. The suit will be decontaminated, bagged for at least 4

hours and the atmosphere inside the bag will be tested to verify the vapor concentrations are below the permissible levels.

C. Aerosol Test

Aerosol testing is done using corn-oil as the simulant to measure any leakage into the suit. In order to properly test suits with statistical significance, 8 suit ensembles will be used. The suit ensembles must include all relevant accessory equipment - gloves, boots, etc. Simulant concentration inside the suit will be sampled at two locations: neck and upper arm. As a minimum, activity will consist of a set of repetitive exercises which mimic user movements. A description of the test and suggested movements made by personnel during the test are *shown in* Appendix B.

Other Considerations

A. Material Strength

Data should be provided that demonstrates that the material has some resistance to tears, rips, or abrasion. ASTM D 4157, *Test Method for Abrasion Resistance of Textile Fabrics* is a good test to determine this resistance.

B. Suit Reuse

This test demonstrates whether the suit can be decontaminated, laundered, and reused after exposure to chemical agent vapor. The use scenario will determine which agents and vapor contamination requirements are appropriate. The suit is placed on a mannequin for exposure to agent (at the required vapor contamination) and at concentrations determined by the use scenario. The suit will be decontaminated, bagged for at least 4 hours and the atmosphere inside the bag will be tested to verify the vapor concentrations are below the permissible levels. The suit %ill then be laundered. This process will be continued for a specified number of cycles as determined by the user. Swatch testing in accordance with A above will be performed using worn and/or abraided material from the suit.

The remaining topics in this section, if applicable, will be discussed in. the submission.

## APPENDIX A

This test procedure was adapted from the 'Semipermeable and Impermeable Materials Static Diffusion Penetration Testing (Liquid Agent Challenge/Vapor Penetration, AP = 0, Single Flow Teat) given in Test Operating Procedure 8-250 1 (Draft) dated 3 March 1997.

The following procedure will be used:

1. Upon receipt of a suit, all available information concerning the suit will be recorded; date of manufacture, lot number, 3eiial number, materials of construction, etc.

2. From each suit, 3 ea. 1 and 15/16 inch diameter material swatches will be taken for each chemical agent tested. Depending upon the suit configuration, 3 ea. = swatches (same diameter) will be taken plus triplicate swatches of other flat components such as other seams, visor, gloves, booties, etc. for each chemical agent tested. Each swatch Will be placed in an airtight bag and given a unique serial number that will be placed an the bag. A list of serial numbers will be kept with the swatches.

3. The environmental chamber will be controlled at a temperature of 90 +/- 2° F and the maximum achievable relative humidity without occurrence of condensation (70% +/- 10% RH). The temperature and RH readings will be checked weekly with a calibrated meter. The test cell air will be drawn from the chamber air. There will be no system control and data acquisition system. The temperature and RH will be recorded M- a computer file. Mow rates will be manually recorded. There will be no differential pressure monitoring since differential pressure gages of sufficient sensitivity are not available.

4. The TOP test cell will be used. When assembling, the cell lugs will be tightened by hand to finger tight. The flow rate beneath each swatch will be 1 liter/minute which will be controlled by a linear mass flow controller. The flows will be checked with a calibrated test meter weekly. Each test cell will be checked for leaks after assembly by connecting it to the vacuum source and checking that the inlet flow is the same as the outlet flow on the mass flow controller (cell lugs will be retightened if flows do not match).

5. The samples will serve as their own negative controls while being preconditioned overnight by being MINICAMS monitored. Eighty mil silicone will be used as a positive control for each test (6suit swatches and 1 silicone swatch).

6. Based on the use scenario appropriate test chemical agents and the contamination density (g/m2) will be chosen. The chemical agent will be applied (1 liter chemical agent droplets) using the click/touch method with a Hamilton repeating dispenser.

7. Seven swatches will be tested at once. MINICAMS with stream selection system will monitor vapor penetration with a 3-minute cycle. There will be 3 blank sampling intervals following the control. Each swatch will be sampled once every 30 minutes. The MINICAMS will be standardized weekly.

8. The test length will be the time (hours) required for the protection.

9. The test cells and o-rings will be aerated between uses. No other cleaning method will be used.

10. The data to be reported are cumulative penetration ($ng/cm^2$) versus elapsed time (minutes) for each swatch. The elapsed time will either be the actual elapsed time or an average elapsed time (the sum of the elapsed time for swatch 1 and t he lapsed time for swatch 6 divided by 2).

## APPENDIX B

In order to properly test suits with statistical significance, 8 suit ensembles should be used. The suit ensembles included relevant accessory equipment such respirators that will be worn with the suits, gloves, and any other equipment that is necessary for chemical agent use. The suit ensembles should be run on at least 10 different subjects with 22 trials. Sampling of suits should be in the neck and upper arm region.

The exercise routine for all suits should include some of the exercises below as well as exercises modeled after the various use scenarios;

Phase 1.

1) standing still, normal breathing
2) bending forward and touching toes
3) jogging in place
4) raising arms above head and looking upward
5) bending knees and squatting
6) crawling on hands and knees
7) torso twists with hands folded on chest
8) standing still, -normal breathing

Phase 2:

1) climb stop ladder
2) move 3 lb. boxes from table to floor
3) rest
4) roll walls and ceiling with paint roller
5) bag clothes
6) rest
7) loosen bolts
8) move 3 lb. boxes from table to floor

NOTE: The Phase I exercises will be performed for 1 minute each for a total of 8 minutes. The Phase 2 exercises will be performed for 4 minutes each for a total of 40 minutes.

# APPENDIX E
# EDGEWOOD CHEMICAL AND BIOLOGICAL CENTER (ECBC)
# HEADSPACE MONITORING PROCEDURES FOR ENVIRONMENTAL SAMPLES
# 17 NOVEMBER 1998

1. Contractor collects environmental sample. Each sample will always be a minimum of two sub-samples (split sample).

2. Contractor delivers one of the sub-samples to monitoring personnel and retains duplicate split sample in the exclusion zone.

3. Monitoring personnel place up to six samples in a sample box heated to 90 degrees $\pm$ 10 degrees Fahrenheit. Open bags and remove sample jar lids. Close sample box lid and allow samples to equilibrate for 15 minutes (sample box is located within the CRZ).

4. Connect MINICAMS probe to sample port of the heated sample box. Run two complete cycles on the MINICAMS.

a. If MINICAMS reading is below the AEL (clear), go to step 16.

b. If MINICAMS reading is above the AEL (hot) for the agent go to step 5.

5. Don mask and gloves, open sample box and replace lids on sample containers.

6. Connect MINICAMS to sample port of heated sample box, and sample until a clear reading is obtained on the MINICAMS.

7. Don mask and gloves, open lid of sample box. Samples will be monitored one at a time.

8. Remove lid from one sample container. Insert MINICAMS probe. Run one cycle on the MINICAMS. Close the sample jar and repeat this procedure, beginning at step 7, on the next sample. All samples must be monitored to assure the hot samples are located. Segregate the samples giving a hot response into a second hot box located in close proximity to the first hot box in the CRZ.

a. If a hot sample cannot be identified, go to step 9.

b. If a hot sample is identified before all the samples in the hot box have been monitored, ensure next sample is monitored starting from Step 5.

9. Contractor delivers the duplicate of the split sample(s) to monitoring personnel and they are placed in the heated sample box and heated to 90 degrees $\pm$ 10 degrees Fahrenheit. Contractor will take the original sample(s) back to the EZ and secure them, pending results of the monitoring of the second set of samples.

10. Allow samples to equilibrate for 15 minutes.

11. Connect MINICAMS to sample port of heated sample box, and sample until a clear reading is obtained on the MINICAMS.

12. Don mask and gloves, open lid of sample box. Samples will be monitored one at a time.

13. Remove lid from sample container. Insert MINICAMS probe. Run one cycle on the MINICAMS. Close the sample jar and repeat this procedure on the next sample. All samples must be monitored to assure the hot samples are located. Segregate the samples giving a hot response by placing in a second hot box located near the first hot box in the CRZ..

14. Collect DAAMS tubes on the hot samples. Collect tubes at 500 milliliters per minute for 30 minutes. Give tubes to the ECBC personnel for analysis in the RTAP. (MINICAMS **CAN NOT** be used for confirmation sampling).

15. Treat "hot" samples as Investigative Derived Waste (IDW).

16. Give "clear" samples to the contractor for proper disposition. Notify the contractor the split sample(s) is ready for shipment.

# GLOSSARY

## Section I
## Abbreviations

A-E.....Architect-Engineer
AEL .....Airborne Exposure Limit
AMC.....Army Materiel Command
AOC .....Army Operations Center
AR .....Army Regulation
ARAR.....Applicable, Relevant and Appropriate Requirement
ARB.....Anomaly Review Board
ASA (I&E).....Assistant Secretary of the Army (Installation and Environment)
ASR.....Archives Search Report
ASSHP .....Abbreviated Site Safety and Health Plan
BRAC .....Base Realignment and Closure
CAA .....Clean Air Act
CACM..... Chemical Agent Contaminated Media
CAIRA.....Chemical Accident or Incident Response or Assistance
CAIS.....Chemical Agent Identification Sets
CASARM .....Chemical Agent Standard Analytical Reference Material
CASHPAC .....Chemical Agent Safety and Health Policy Actions Committee
CBD.....Commerce Business Daily
CDRL .....Contract Data Requirements List
CECC-C.....HQUSACE Office of Chief Counsel
CEMP-R.....Corps of Engineers Military Programs, Environmental Division
CERCLA .....Comprehensive Environmental Response, Compensation, and Liability Act
CERE-M.....Corps of Engineers Real Estate, Military Division
CESO .....Corps of Engineers Safety Office
CFR.....Code of Federal Regulations
CO.....Contracting Officer
COC .....Contaminants of Concern
COR.....Contracting Officer's Representative
CPC.....Chemical Protective Clothing
CPFF .....Cost-Plus-Fixed-Fee
CPR.....Cardiopulmonary Resuscitation
CRP .....Community Relations Plan
CRZ.....Contamination Reduction Zone
CWA .....Clean Water Act

CWM.....Chemical Warfare Materiel
DA.....Department of the Army
DA Pam.....Department of the Army Pamphlet
DAAMS.....Depot Area Air Monitoring System
DACS-SF.....Department of the Army, Office of the Chief of Staff
DDESB.....Department of Defense Explosives Safety Board
DERP.....Defense Environmental Restoration Program
DHHS.....Department of Health and Human Services
DID.....Data Item Description
DOD.....Department of Defense
DOT.....Department of Transportation
ECBC.....Edgewood Chemical and Biological Center
EE/CA.....Engineering Evaluation/Cost Analysis
EM.....Engineer Manual
EMT.....Emergency Medical Technician
EOD.....Explosive Ordnance Disposal
EP.....Engineer Pamphlet
EPA.....Environmental Protection Agency
ER.....Engineer Regulation
ESS.....Explosives Safety Submission
EZ.....Exclusion Zone
FAR.....Federal Acquisition Regulation
FDE.....Findings and Determination of Eligibility
FOST.....Finding of Suitability to Transfer
FUDS.....Formerly Used Defense Site
GB.....Sarin (Isopropyl methylphosphonofluoridate)
GFP.....Government Furnished Property
GIS.....Geographic Information System
H.....Levinstein Mustard
HAZMAT.....Hazardous Material
HAZWOPER.....Hazardous Waste Operations and Emergency Response
HQDA.....Headquarters, Department of the Army
HQUSACE.....Headquarters, United States Army Corps of Engineers
HTRW.....Hazardous, Toxic, and Radioactive Waste
IDO.....Indefinite Delivery Order
IDW.....Investigative Derived Waste
IGE.....Independent Government Estimate
IHF.....Interim Holding Facility
INPR.....Inventory Project Report
IOC.....Industrial Operations Command

IRP.....Installation Restoration Program
L.....Lewiste
LPM.....Liters per minute
MACOM.....Major Command
MARB.....Materiel Assessment Review Board
MCE.....Maximum Credible Event
MCX.....Mandatory Center of Expertise
MEAP.....Mobile Environmental Analytical Platform
MINICAMS.....Miniature Chemical Agent Monitor System
MIPR.....Military Interdepartmental Purchase Request
MPM.....Most Probable Munition
MOA.....Memorandum of Agreement
MSC.....Major Subordinate Command
MSD.....Minimal Separation Distance
MSDS.....Material Safety Data Sheet
NAD.....North American Datum
NCP.....National Contingency Plan
NDAI.....No DOD Action Indicated
NEPA.....National Environmental Policy Act
NGS.....National Geodetic Society
NIOSH.....National Institute for Occupational Safety and Health
NOSE.....No Significant Effects
NSCWM.....Non-Stockpile Chemical Warfare Materiel
NTCRA.....Non-Time Critical Removal Action
OC.....Office of Counsel
ODASAF.....Office of the Deputy Assistant to the Secretary of the Air Force
OE.....Ordnance and Explosives
OE MCX.....Ordnance and Explosives Mandatory Center of Expertise
OSG.....Office of the Surgeon General
OSHA.....Occupational Safety and Health Administration
PAE.....Preliminary Assessment of Eligibility
PAO.....Public Affairs Office (or Officer)
PINS.....Portable Isotopic Neutron Spectroscopy
PL.....Public Law
PM.....Project Manager
PMNSCM.....Product Manager for Non-Stockpile Chemical Materiel
PMCD.....Program Manager for Chemical Demilitarization
PMP.....Project Management Plan
POC.....Point of Contact

PPE.....Personal Protective Equipment
Pre-Op.....Pre-Operational Survey
Q-D .....Quantity Distance
QA.....Quality Assurance
QC.....Quality Control
QCS.....Quality Control Specialist
RAB.....Restoration Advisory Board
RAC.....Risk Assessment Code
RCRA.....Resource Conservation and Recovery Act
RCWM.....Recovered Chemical Warfare Materiel
RECON.....Reconnaissance
RFP.....Request for Proposal
ROE.....Right-of-Entry
RTAP.....Real-Time Analytical Platform
SARA .....Superfund Amendments and Reauthorization Act of 1986
SBCCOM.....U.S. Army Soldiers Biological and Chemical Command
SI.....Site Inspection
SOP .....Standing Operating Procedure
SOW.....Statement of Work
SSHP .....Site Safety and Health Plan
SUXOS.....Senior UXO Supervisor
T&M.....Time and Materials
TAG.....Technical Advisory Group
TAPP.....Technical Assistance for Public Participation
TB.....Technical Bulletin
TCRA .....Time-Critical Removal Action
TEU .....Technical Escort Unit
TM.....Technical Manual
USACE.....United States Army Corps of Engineers
USACHPPM .....U.S. Army Center for Health Promotion and Preventive Medicine
USAESCH.....U.S. Army Engineering and Support Center, Huntsville
USATCES .....U.S. Army Technical Center for Explosives Safety
USC.....United States Code
USNAVEOD.....U.S. Naval Explosive Ordnance Disposal
UXO .....Unexploded Ordnance
UXOSO.....UXO Safety Officer
VX.....O-ethyl S-(2-diisopopylaminoethyl) methylphosphonthiolate

**Section II**
**Terms**

**Action Memorandum**
Approves time-critical removal action and also concludes the engineering evaluation/cost analysis. Provides a concise, written record of the decision to select an appropriate removal action. As the primary decision document, it substantiates the need for a removal action, identifies the proposed action, and explains the rationale for the removal action selected.

**Active Installations**
Installations under the custody and control of DOD. Includes operating installations, installations in a standby or layaway status, and installations awaiting closure under the Base Realignment and Closure (BRAC) legislation. Examples include but are not limited to posts, camps (including National Guard camps), forts, depots, activities, ports, ammunition supply points, basic load ammunition storage areas, and ammunition plants.

**Active Range**
A military range that is currently in service and is being regularly used for range activities. (40 CFR 266.201)

**Administrative Record**
The body of documents that "forms the basis" for the selection of a particular response at a site. Documents that are included are relevant documents that were relied upon in selecting the response action as well as relevant documents that were considered but were ultimately rejected. (ER 1110-1-8153)

**Anomaly Avoidance**
Techniques employed by EOD or UXO personnel at sites with known or suspected OE to avoid any potential surface UXO and any subsurface anomalies. This usually occurs at mixed hazard sites when HTRW investigations must occur prior to execution of an OE removal action. Intrusive anomaly investigation is not authorized during ordnance avoidance operations. (EP 75-1-2)

**Anomaly Review Board (ARB)**
A technical group established to provide technical guidance and quality assurance oversight of the review and resolution of geophysical information related to unresolved anomalies at a site. (EP 1110-1-18)

**Applicable or Relevant, and Appropriate Requirements (ARARs)**
Applicable requirements are cleanup standards, standards of control, and other substantive environmental protection requirements promulgated under federal or state environmental law that

specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA site. Relevant and appropriate requirements are cleanup standards that while not "applicable", address situations sufficiently similar to those encountered at a CERCLA site that their use is well-suited to the particular site.

**Approval Memorandum**
Secures management approval and funding to conduct the engineering evaluation/cost analysis.

**Archives Search Report (ASR)**
A detailed investigation to report on past OE activities conducted on an installation. The principal purpose of the Archives Search is to assemble historical records and available field data, assess potential ordnance presence, and recommend follow-up actions at a DERP-FUDS. There are four general steps in an Archives Search: records search phase, site safety and health plan, site survey, archives search report including risk assessment.

**Base Realignment and Closure (BRAC)**
Program governing the scheduled closing of Department of Defense sites. (Base Closure and Realignment Act of 1988, Public Law 100-526, 102 Stat. 2623, and the Defense Base Closure and Realignment Act of 1990, Public Law 101-510, 104 Stat. 1808)

**Chemical Agent Contaminated Media (CACM**
Any mixture of detectable concentrations of chemical agent(s) with soil, water, debris, or other solid or liquid media.

**Community Relations Plan (CRP)**
The Community Relations Plan (CRP) serves as the framework to establish a successful information exchange with the public for OE response actions. The CRP follows guidelines set forth under CERCLA and the SARA. Each CRP must be tailored to fit the individual site and situation and should also accommodate any site-specific agreements between the U.S. Army and the EPA or state environmental agencies. The CRP is not a static document and should be revised to reflect the project's development/progress.

**Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)**
Also known as "Superfund", this congressionally enacted legislation provides the methodology for the removal of former operations. Response actions must be performed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan.

**Construction Support**
Support provided by qualified UXO personnel during construction activities at potential OE sites to ensure the safety of construction personnel from the harmful effects of UXO. When a determination is

made that the probability of encountering UXO is low, a two person UXO team stands by in case the construction contractor encounters a suspected UXO. When a determination is made that the probability of encountering a UXO is moderate to high, UXO teams are required to conduct subsurface UXO clearance for the known construction footprint in conjunction with the construction contractor during intrusive activities. The level of effort for construction support will be determined on a case-by-case basis in coordination with OE MCX. (ER 1110-1-8153)

**Conventional Ordnance and Explosives**
The term "conventional OE" refers to ordnance and explosives (see definition) other than CWM, BWM and nuclear ordnance. (EP 75-1-2)

**Defense Environmental Restoration Program (DERP)**
Established in 1984, DERP promotes and coordinates efforts for the evaluation and cleanup of contamination at Department of Defense installations. (10 U.S.C. 2701)

**Design Center**
A specified USACE field office assigned a singular technical mission that is permanent and USACE-wide in scope. The designated office is to be considered the "lead activity" in a specialized area where capability needs to be concentrated for maximum effectiveness, economy, and efficiency. The OE Design Center (in coordination with the district PM) will execute all phases of the OE response project after the approval of the INPR unless the removal action is transferred to an approved district. Only the USAESCH OE Design Center is authorized to execute any phase of a Non-Stockpile CWM response. (ER 1110-1-8153)

**Districts Approved to Execute OE Removal Actions**
These districts are selected and approved by the MSC Commander with concurrence from the OE MCX, trained, and assigned the mission of conducting OE removal actions. The districts are responsible for final removal action execution. (ER 1110-1-8153)

**Easement**
An easement allows the holder to use the land of another or to restrict the uses of the land. An easement "appurtenant" provides a specific benefit to a particular piece of land. For example, allowing a neighbor to walk across your land to get to the beach. The neighbor's land, the holder of the easement, benefits by having beach access through your land. An easement "in gross" benefits an individual or company. For example, allowing the utility company to come on your land to lay a gas line. The utility company, the holder of the easement, benefits by having use of the land to lay the gas line. An affirmative easement allows the holder to use another person's land in a way that, without the easement, would be unlawful - for example, allowing a use that would otherwise be a trespass. A negative easement prohibits a lawful use of land - for example, creating a restriction on the type and amount of development of land.

**Emergency Removal Response Actions**
Emergency Removal Response Actions address immediate, unacceptable hazards. These actions are normally accomplished by Explosive Ordnance Disposal (EOD) units and may or may not require USACE support.

**Engineering Evaluation/Cost Analysis (EE/CA)**
An EE/CA is prepared for all non-time-critical removal actions as required by Section 300.415(b)(4)(i) of the NCP. The goals of the EE/CA are to identify the extent of a hazard, to identify the objectives of the removal action, and to analyze the various alternatives that may be used to satisfy these objectives for cost, effectiveness, and implementability.

**Exclusion Zone (EZ)**
A safety zone established around an OE work area. Only project personnel and authorized, escorted visitors are allowed within the exclusion zone. Examples of exclusion zones are safety zones around OE intrusive activities and safety zones where OE is intentionally detonated. The exclusion zone is the area where potential contamination may exist. (DDESB-KO, 27 January 1990)

**Explosive Ordnance Disposal (EOD)**
The detection, identification, field evaluation, rendering safe, recovery, and final disposal of unexploded ordnance or munitions.

**Explosives Safety Submission (ESS)**
The document which serves as the specifications for conducting work activities at the project. The ESS details the scope of the project, the planned work activities, and potential hazards (including the maximum credible event) and the methods for their control. (EP 1110-1-18)

**Explosive Soil**
Explosive soil refers to mixtures of explosives in soil, sand, clay, or other solid media at concentrations such that the mixture itself is explosive.

(a) The concentration of a particular explosive in soil necessary to present an explosion hazard depends on whether the particular explosive is classified as "primary" or "secondary." Guidance on whether an explosive is classified as "primary" or "secondary" can be obtained from the OE MCX or Chapters 7 and 8 of TM 9-1300-214, Military Explosives.

(b) Primary explosives are those extremely sensitive explosives (or mixtures thereof) that are used in primers, detonators, and blasting caps. They are easily detonated by heat, sparks, impact, or friction. Examples of primary explosives include Lead Azide, Lead Styphnate, and Mercury Fulminate.

(c) Secondary explosives are bursting and booster explosives (i.e., they are used as the main bursting charge or as the booster that sets off the main bursting charge). Secondary explosives are much less sensitive than primary explosives. They are less likely to detonate if struck or when exposed to friction or to electrical sparks. Examples of secondary explosives include Trinitrotoluene (TNT), Composition B, and Ammonium Picrate (Explosive D).

(d) Soil containing 10 percent or more by weight of any secondary explosive or mixture of secondary explosives is considered "explosive soil." This determination was based on information provided by the USAEC as a result of studies conducted and reported in USAEC Report AMXTH-TE-CR 86096.

(e) Soil containing propellants (as opposed to primary or secondary high explosives) may also present explosion hazards.

**Formerly Used Defense Sites (FUDS)**
FUDS includes those properties previously owned, leased, or otherwise possessed by the U.S. and under the jurisdiction of the Secretary of Defense; or manufacturing facilities for which real property accountability rested with DOD but were operated by contractors (Government owned - contractor operated) and which were later legally disposed of. FUDS is a subprogram of the DERP. Restoration of military land was extended to formerly used sites in 1983 under Public Law 98-212 (DOD Appropriations Act of FY84).

**Geophysical Techniques**
Techniques utilized for the detection and measurement of buried anomalies (e.g., ferromagnetic indicators and ground penetrating radar) to investigate the presence of munitions. (ER 385-1-95)

**Hazardous, Toxic, and Radioactive Waste (HTRW) Activities**
HTRW activities include those activities undertaken for the Environmental Protection Agency's Superfund program, the Defense Environmental Restoration Program (DERP), including Formerly Used Defense Sites (FUDS), and Installation Restoration Program (IRP) sites at active DOD facilities, HTRW actions associated with Civil Works projects, and any other mission or non-mission work performed for others at HTRW sites. (ER 385-1-92)

**Information Repository**
A repository, generally located at libraries or other publicly accessible locations, which contains documents reflecting the on-going environmental restoration activities. This may include the EE/CA, CRP, RAB meeting minutes, public notices, public comments and responses to those comments, etc.

**Intrusive activity**
An activity which involves or results in the penetration of the ground surface at an area known or suspected to contain OE. Intrusive activities can be of an investigative or removal action nature. (ER 385-1-95)

**Inventory Project Report (INPR)**
The report resulting from the preliminary assessment. The INPR includes data as well as a recommendation for further action and guides investigators through further site studies. Documents whether DOD is responsible for contamination at a FUDS.

**Mandatory Center of Expertise (MCX)**
An MCX is a USACE organization that has been approved by HQUSACE as having a unique or exceptional technical capability in a specialized subject area that is critical to other USACE commands. Specific mandatory services to be rendered by an MCX are identified on the MCX's homepage. These services may be reimbursable or centrally funded. The USAESCH is the OE MCX for the USACE. (ER 1110-1-8153)

**Maximum Credible Event (MCE)**
The worst single event that could occur at any time, with maximum release of a chemical agent from a munition, container, or process as a result of unintended, unplanned, or accidental occurrence. (HQDA Interim Guidance for Biological Warfare Materiel (BWM) and Non-Stockpile Chemical Warfare Materiel (CWM) Response Activities)

**Military Munitions**
All ammunition products and components produced or used by or for the US DOD or the US Armed Services for national defense and security, including military munitions under the control of the DOD, the US Coast Guard, the US DOE, and National Guard personnel. The term military munitions includes: confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries used by DOD components, including bulk explosives and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components thereof. Military munitions do not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components there-of. However, the term does include non-nuclear components of nuclear devices, managed under DOE's nuclear weapons program after all required sanitization operations under the Atomic Energy Act of 1954, as amended, have been completed. (40 CFR 260.10)

**Minimum Separation Distance (MSD)**
The minimum separation distance required for personnel (public and UXO Qualified), as a result of an intentional and unintentional detonation of an item of ordnance, that could occur during OE activities. The event must be realistic with reasonable probability of occurrence. (ER 385-1-95)

**Most Probable Event (MPE)**
The most likely event, as a result of an accidental, unplanned, or unintended detonation of an item of ordnance, which could occur during OE activities. The event must be realistic with reasonable probability of occurrence. (ER 385-1-95)

**Most Probable Munition (MPM)**
The most probable munition to be recovered as a result of previous training during OE/CWM removal actions based on historical information. The event must be realistic with reasonable probability of occurrence. (ER 385-1-95)

**National Oil and Hazardous Substance Pollution Contingency Plan (NCP)**
Revised in 1990, the NCP provides the regulatory framework for responses under CERCLA. The NCP designates the Department of Defense as the removal response authority for ordnance and explosives hazards.

**Non-Stockpile Chemical Warfare Materiel**
CWM (see definition) that is not included in the chemical stockpile. Non-stockpile CWM is divided into five categories: buried CWM, recovered chemical weapons (items recovered during range clearing operations, from chemical burial sites, and from research and development testing), former chemical weapon production facilities, binary chemical weapons, and miscellaneous CWM (unfilled munitions and devices and equipment specially designed for use directly in connection with employment of chemical weapons). (HQDA Interim Guidance for Biological Warfare Materiel (BWM) and Non-stockpile Chemical Warfare Materiel (CWM) Response Activities)

**Non-Time-Critical Removal Action (NTCRA)**
NTCRAs are actions initiated in response to a release or threat of a release that poses a risk to human health, its welfare, or the environment. Initiation of removal cleanup actions may be delayed for six months or more.

**Ordnance and Explosives (OE)**
OE consists of either (1) or (2) below:
(1) Ammunition, ammunition components, chemical or biological warfare materiel or explosives that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, buried, or fired. Such ammunition, ammunition components, and explosives are no longer under accountable record control of any DOD organization or activity. (HQDA Policy Memorandum "Explosives Safety Policy for Real Property Containing Conventional OE")

(2) Explosive Soil. See definition under "Explosive Soil." (ER 1110-1-8153)

**OE Anomaly**
Any item that is seen as a subsurface irregularity after geophysical investigation. This irregularity should deviate from the expected subsurface ferrous and non-ferrous material at a site (i.e., pipes, power lines, etc.). (ER 385-1-95)

**OE Safety Specialist**
USACE Personnel, classified as a GS-018 Safety Specialist, and who is UXO qualified. OE Safety Specialists perform safety, quality assurance and UXO subject matter expert functions for the Government. The Safety Specialist may reside in and report to the construction field office or may reside in the engineering/construction office within the OE Design Center. (ER 1110-1-8153)

**Preliminary Assessment of Eligibility (PAE)**
The PA is the initial phase of the non-time-critical response action process. A PA includes a review of existing information and an off-site reconnaissance, if appropriate, to determine if a release may require additional investigation or action. A PA may include an on-site reconnaissance, if appropriate. The findings of the PA are reported in the INPR, along with recommendations for further action, if appropriate. This document is used to determine property and project eligibility under DERP-FUDS.

**Quantity Distance (Q-D)**
The quantity of explosives material and distance separation relationships that provide defined types of protection. These relationships are based on levels of risk considered acceptable for the stipulated exposures and are tabulated in the appropriate Q-D tables provided in DOD 6055.9-STD. Separation distances are not absolute safe distances but are relative protective safe distances. Greater distances than those shown in the Q-D tables will be used whenever possible. (DOD 6055.9-STD)

**Recovered Chemical Warfare Materiel (RCWM)**
An item configured as a munition containing a chemical substance that is intended to kill, seriously injure, or incapacitate a person through its physiological effects. Also includes V- and G- series nerve agent, H- series blister agent, and lewisite in other- than-munition configurations. Due to their hazards, prevalence, and military-unique application, chemical agent identification sets (CAIS) are also considered CWM. CWM does not include: riot control agents, chemical herbicides; smoke and flame producing items; or soil, water, debris, or other media contaminated with chemical agent. (HQDA Interim Guidance for Biological Warfare Materiel and Non-Stockpile Chemical Warfare Materiel Response Activities)

**Removal Action**
The cleanup or removal of OE from the environment to include the disposal of removed materiel. The term includes, in addition, without being limited to, security fencing or other measures to prevent, minimize, or mitigate damage to the public health or welfare or to the environment. (ER 1110-1-8153)

**Resource Conservation and Recovery Act (RCRA)**

Enacted in 1976, RCRA promotes the protection of health and the environment. It regulates waste generation, treatment, storage, transportation, and disposal for facilities currently in operation. The OE removal process is affected by RCRA if OE must be disposed off-site.

**Response Action**
Action taken instead of or in addition to a removal action to prevent or minimize the release of OE so that it does not cause substantial danger to present or future public health or welfare or the environment. (ER 1110-1-8153)

**Restoration Advisory Board (RAB)**
A forum for discussion and exchange of information between agencies and the affected communities. RABs provide an opportunity for stakeholders to have a voice and actively participate in the review of technical documents, to review restoration progress, and to provide individual advice to decision makers regarding restoration activities. (ER 1110-1-8153)

**Risk Assessment Code (RAC)**
An expression of the risk associated with a hazard. The RAC combines the hazard severity and accident probability into a single arabic number on a scale from 1 to 5, with 1 being the greatest risk and 5 the lowest. The RAC is used to prioritize response actions.

**Senior UXO Supervisor**
Supervises all contractor on-site UXO activities. This individual will be a graduate of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD or the U.S. Naval Explosive Ordnance Disposal School, Indian Head, MD. This individual will have at least 15 years combined active duty military EOD and contractor UXO experience, to include at least 10 years in supervisory positions. A minimum of 6 years of the required 15 years will have been on active duty in military EOD units. This individual will have documented experience with or specialized training in the type of OE expected to be encountered on the site. (USAESCH OE MCX Personnel and Work Standards for Ordnance Response, 30 July 1996)

**Site Inspection (SI)**
Activities undertaken to determine whether there is a release or potential release and the nature associated threats. The purpose is to augment the data collected in the PA and to generate, if necessary, sampling and other field data to determine the presence, type, distribution, density and location of OE. The results of the SI are reported in an Archives Search Report (ASR).

**Stakeholder**
Stakeholders include federal, state, and local officials, community organizations, property owners, and others having a personal interest or involvement, or having a monetary or commercial involvement in the real property which is to undergo an OE response action. (ER 385-1-95)

**Superfund Amendments and Reauthorization (SARA)**
Enacted in 1986, this legislation establishes standards for cleanup activities, requires federal facility compliance with CERCLA, and clarifies public involvement requirements.

**Time-Critical Removal Action (TCRA)**
TCRAs respond to a release or threat of release that poses such a risk to public health (serious injury or death), or the environment, that clean up or stabilization actions must be initiated within six months.

**Technical Assistance for Public Participation (TAPP)**
Program that can provide independent assistance to Restoration Advisory Boards in interpreting scientific and engineering issues with regard to the nature of OE hazards and response activities at an OE project site. (ER 1110-1-8153)

**Technical Escort Unit (TEU)**
Military chemical agent response unit.

**Unexploded Ordnance (UXO)**
Military munitions that have been primed, fuzed, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material and remain unexploded either by malfunction, design, or any other cause. (40 CFR 266.201)

**UXO Personnel**
Contractor personnel who have completed specialized military training in EOD methods and have satisfactorily performed the EOD function while serving in the military. Various grades and contract positions are established based on skills and experience. Check with the OE MCX for current ratings.

**UXO Safety Officer (UXOSO)**
Contractor personnel with the responsibility of enforcing the contractor's SSHP. This individual must therefore be in the field whenever possible to observe operations. This individual will have the same minimum qualifications as the UXO Supervisor. In addition, this individual will have the specific training, knowledge, and experience necessary to implement the SSHP and verify compliance with applicable safety and health requirements.

**UXO Technician I**
This individual will be a graduate of the EOD Assistant's Course at Redstone Arsenal, AL or Eglin AFB, FL. A UXO Assistant may advance to a UXO Specialist category after 5 years combined active duty military EOD and contractor UXO experience. A UXO Assistant will not perform UXO procedures without the direct supervision of a UXO Specialist, UXO Supervisor, or Senior UXO Supervisor.

**UXO Technician II**
This individual will be a graduate of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD or U.S. Naval EOD School, Indian Head, MD. The UXO Specialist may be a UXO Assistant with at least 5 years combined military EOD and contractor UXO experience.

**UXO Technician III**
Supervises a UXO team. This individual will be a graduate of the U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MD or the U.S. Naval Explosive Ordnance Disposal School, Indian Head, MD. This individual will have at least 10 years combined active duty military EOD and contractor UXO experience. This individual will have experience in OE clearance operations and supervising personnel.